University of Southampton

Faculty of Environmental and Life Sciences

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Understanding Anxiety: The Role of Psychological Flexibility, Intolerance of Uncertainty and Death Anxiety as Transdiagnostic Mechanisms

by

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Abstract

Anxiety disorders are among the most common mental health conditions globally and cause significant impairment in psychosocial functioning. Transdiagnostic processes such as psychological flexibility, intolerance of uncertainty and death anxiety have shown to be important in the development and maintenance of anxiety. This thesis aims to explore how these processes operate across populations, and more specifically, among healthcare professionals (HCPs). To explore these processes, a systematic review and empirical study were undertaken. A systematic review and meta-analysis examined the association between psychological flexibility and anxiety. The meta-analysis of 29 studies found a moderate negative association between PF and anxiety, however effect sizes varied by PF measure used, anxiety construct measured and sample size. Alongside this, a cross-sectional, mixed-methods study explored health anxiety among HCPs working in inpatient oncology, neurorehabilitation and mental health acute/psychiatric intensive care units. Psychological flexibility, intolerance of uncertainty and death anxiety were explored as predictors of HA. Quantitative findings found no significant differences between staff groups and HA. Death anxiety and psychological flexibility emerged as significant predictors of HA. Thematic analysis of qualitative data generated three overarching themes: (1) health consciousness; (2) shifting values, perspectives and acceptance; and (3) workplace stressors and coping. These findings contribute to the current literature on transdiagnostic mechanisms in anxiety. The meta-analysis identifies key moderators which may account for the inconsistencies in the literature. Additionally, the empirical study offers novel insights into how transdiagnostic processes are associated with health anxiety among HCPs, and the qualitative findings offer a nuanced understanding of the impact of clinical exposure (e.g. death, illness) on HCPs lifestyle choices and perspectives on life. This thesis may help to inform the development of more targeted interventions and highlights important areas for future research.

Keywords: anxiety, anxiety disorders, healthcare workers, health anxiety, psychological flexibility, death anxiety, intolerance of uncertainty

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Research Thesis: Declaration of Authorship

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Title of thesis: Understanding anxiety: The role of psychological flexibility, intolerance of uncertainty and death anxiety as transdiagnostic mechanisms

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature: Date: 17/05/2025

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Definitions and Abbreviations

AAQ..... Acceptance and Action Questionnaire

ACT ..... Acceptance and Commitment Therapy

ANOVA..... Analysis of variance

APA ..... American Psychological Association

CBT..... Cognitive Behavioural Therapy

CMA ..... Comprehensive Meta-Analysis

CompACT ..... Comprehensive assessment of Acceptance and Commitment Therapy processes

DAS ..... Templer Death Anxiety Scale

DASS ..... Depression Anxiety Stress Scales

DSM ..... The Diagnostic and Statistical Manual of Mental Disorders

FIT-60..... Flexibility Index Test

GAD..... Generalised Anxiety Disorder

GAD-2 ..... Generalised Anxiety Disorder Questionnaire – 2 items

GAD-7 ..... Generalised Anxiety Disorder Questionnaire – 7 items

HA ..... Health Anxiety

HA-A..... Hamilton Anxiety Rating Scale

HCPs..... Healthcare Professionals

IDAS-II ..... Inventory of Depression and Anxiety Symptoms

IUS-12 ..... Intolerance of Uncertainty Scale-12

JBI ..... Joanna Briggs Institute

MPFI..... Multidimensional Psychological Flexibility Inventory

NHS ..... National Health Service

OESQ..... Open and Engaged State Questionnaire

PF ..... Psychological Flexibility

PICU ..... Psychiatric Intensive Care Unit

PPFI..... Personalised Psychological Flexibility Index

PPI..... Patient and Public Involvement

PROMIS..... Patient-Reported Outcomes Measurement Information System

SES ..... Socioeconomic Status

SHAI-18 ..... Short Health Anxiety Inventory – 18 items

TMT..... Terror Management Theory

WI-6 ..... Whiteley Index – 6 items

UK ..... United Kingdom

USA ..... United States of America

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Declaration:

I acknowledge the use of ChatGPT to:

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Chapter 1: Introduction and Research Overview

Word count: 2,477

This chapter outlines the conceptual frameworks and research approach that informed the thesis, which is comprised of a systematic review and empirical study. It introduces anxiety and explains the rationale for focusing on healthcare professionals (HCPs) in the context of physical health setting compared to mental health settings. The processes of psychological flexibility and intolerance of uncertainty are briefly introduced and are discussed in further detail in subsequent chapters. Terror Management Theory (TMT; Greenberg et al., 1986) is discussed in more detail as it provides context of how death anxiety is theoretically understood in this thesis. The researcher's ontological and epistemological stance and a key limitation of the empirical study are also discussed in this chapter.

Anxiety is an adaptive response shaped by evolution for detecting and responding to potential threats (Meacham & Bergstrom, 2016). Although the experience of anxiety may feel uncomfortable, when proportionate to a threat, it can support effective decision-making, heighten alertness and enhance performance in situations which are uncertain or risky (Robinson et al., 2013). Individuals with higher anxiety may have an exaggerated threat perception and perceive innocuous stimuli as threatening (Abramowitz & Blakey, 2020). While anxiety may be triggered by the perception of threat, how an individual interprets, responds and copes shapes the intensity and persistence of anxiety (Bystritsky et al., 2013). Responses to anxiety characterised by rigid patterns such as avoidance, denial and overcontrol may perpetuate anxiety, compared to adaptive responses such as engaging meaningfully with goals, tolerating anxious feelings and acceptance (Kasi et al., 2012). These contrasting patterns of behaviour reflect the core processes of psychological flexibility, a construct that has received increased attention and underpins Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) and is constructed by contextual behavioural science (Falletta-Cowden et al., 2023; Jando & Dionne, 2024). Despite the growing interest in psychological flexibility and its relevance to anxiety, the current literature has been heavily criticised due to faulty measurement and poor conceptualisation of psychological flexibility (Cherry et al., 2021; Doorley et al., 2020). To address this, a systematic review was conducted to explore the association between psychological flexibility and anxiety.

The empirical research focused on exploring health anxiety (HA) in HCPs working in physical health settings (inpatient oncology and neurorehabilitation) compared to those in a mental health setting (acute/ Psychiatric Intensive Care Unit [PICU]). HA can cause significant distress and impact on an individual's psychological functioning (Bailey, 2024) and is associated with increased sickness leave (Eilenberg, Frostholm, et al., 2015; Sunderland et al., 2013) and healthcare utilization (Bobevski et al., 2016). Despite the significant impact HA has on an individual's life, there are no NICE guidelines focusing specifically on HA (Bailey, 2024). This underscores the importance of understanding the psychological mechanisms which underpin HA to inform interventions.

The decision to focus on HA in HCPs was shaped by theoretical frameworks, previous literature and the researcher's own experience of working in an oncology setting. HCPs working in inpatient oncology and neurorehabilitation services were the group of interest given their repeated exposure to death, severe physical illness and injury and often facing high levels of uncertainty (Laor-Maayany et al., 2019; Murray et al., 2019). Psychological flexibility may play an important role in mitigating adverse psychological outcomes across this population, as evidenced by research which has shown psychological flexibility may influence mental health wellbeing in surgeons (Greville-Harris et al., 2024). Previous research has also recommended the need for future studies to explore and address the wellbeing of HCPs working in these settings (Chambers-Baltz et al., 2023; Lapen et al., 2025).

HCPs working in mental health settings were also recruited for the study as a comparison group. Mental health professionals encounter significant occupation stressors such as frequent violence, aggression, suicide, self-harm and low staffing levels (Malik et al., 2021; McIvor et al., 2022) which can have a profound effect on individuals and result in trauma responses (Causer et al., 2019). Although mental health HCPs encounter death and dying in their work, HCPs working in physical health settings may have more immediate and frequent encounters to death related to physical illness, injuries and accidents, increasing awareness of their own death and impacting their emotional, physical and psychological health (Roche et al., 2025). This exposure may involve observing patients rapidly deteriorating in physical health (e.g. weight loss, tumour growth, loss of

motor function), hearing about existential concerns and olfactory experiences such as bodily fluids, infections and hospital smells, compared to mental health settings. These experiences may result in HCPs in physical health settings developing greater awareness of health and body fragility which may reinforce health-related worries (Saeedi et al., 2022). By having both groups in the study, it allowed the researchers to explore whether mortality salience and exposure to illness may result in differences in health anxiety levels.

Encounters with critically ill patients and death whilst working in an inpatient oncology service increased the researcher's awareness of the emotional and physical toll of these situations on HCPs. Additionally, the researcher noticed becoming more aware of bodily symptoms and a heightened attentional bias to health-threat stimuli. Conversations with other HCPs highlighted that these experiences were not uncommon, prompting further curiosity and interest in how HCPs manage these experiences. This experience together with the established literature and theory informed the current empirical study.

Within this thesis, the processes of psychological flexibility, intolerance of uncertainty and construct of death anxiety are explored in the context of HA. Both psychological flexibility and intolerance of uncertainty which refers to an individual's ability to tolerate ambiguous and unpredictable events (Carleton, 2012) have been considered as important transdiagnostic mechanisms in anxiety, including HA (Eilenberg, Fink, et al., 2015; Tull et al., 2020). Their role in anxiety disorders have underpinned treatment interventions, for example ACT focuses on enhancing psychological flexibility through six processes (Hayes et al., 2013) and intolerance of uncertainty has been highlighted as a cognitive vulnerability increasing worry and anxiety in cognitive-behavioural models of anxiety (Dugas et al., 1998). For these reasons they were also explored as predictors of HA in HCPs.

Death anxiety has been associated with HA (Menzies et al., 2019) and, given mortality salience is high amongst HCPs working in physical health settings, death anxiety was explored as a key psychological process in the empirical study. Death anxiety was viewed through the lens of TMT (Greenberg et al., 1986) which proposes that mortality salience even outside of conscious awareness

can provoke anxiety. To manage anxiety, proximal and distal defences are activated (Pyszczynski et al., 1999). Proximal defences are activated when one is exposed to mortality cues and function by suppressing or controlling thoughts related to death. These proximal defences may manifest in the form of excessive checking and monitoring, hypervigilance, cognitive avoidance, seeking reassurance and avoidance of situations associated with illness to manage or suppress health or death-related threats, which are consistent with HA symptoms (Abramowitz, 2008). Distal defences occur when thoughts of death are not in immediate awareness, and reinforce a sense of meaning, increase self-esteem and cultural worldviews. For example, HCPs may derive meaning from their roles by saving lives, making a difference to people's lives and recognition from others (Bamforth et al., 2023), which may also increase their self-esteem. However, when faced with death or treatment complications, it may disrupt this buffering system which may impact psychological wellbeing (Yetzer & Pyszczynski, 2019). Exploring the role of death anxiety in HA provides an opportunity to look beyond occupational stressors and understand how death anxiety may be associated with health-related anxiety among HCPs.

1.1 Researcher's Ontological and Epistemological Position

A critical realist ontological position was taken for both the systematic review and empirical study. Critical realism (Bhaskar, 2013) asserts that there are underlying mechanisms and structures that are unobservable which influence individual's experiences and behaviours. It differentiates between what is observable (what can be measured and seen) and what is real (underlying processes). This thesis aligned with the critical realist position as the researchers aimed to not just focus on examining the relationship between staff group and health anxiety but to also explore underlying psychological and contextual mechanisms that may predict HA among HCPs. Both the empirical and systematic review were grounded on established literature and theories such as TMT. Additionally, qualitative methods were employed in the empirical study to gather insights from HCPs about lifestyle changes which may not have been observable using quantitative measures alone.

Reflexive thematic analysis was used due to its alignment with a critical realist position (Braun & Clarke, 2021). The researcher did not assume that participants written comments were an

objective truth, rather that it was shaped by language, social and contextual factors such as professional experience and culture. Additionally, reflexive thematic analysis and critical realism acknowledge the researcher's role in interpreting the data and how themes are developed through interpretive engagement (Braun and Clarke, 2021; Fryer, 2022). Braun and Clarke (2021) highlight the importance of researcher's subjectivity in meaning-making and that it should not be viewed as something to be eliminated.

The researcher acknowledges that data interpretation was not only influenced by pre-existing theoretical knowledge but also personal experiences, cultural background and clinical experience. The researcher's own experience of working in an oncology service where they noticed increased worries about health and death may have shaped how they interpreted the data. Responses describing health-promoting behaviours and existential themes may have stood out and been coded as they resonated with the researcher's experiences. Additionally, the researcher's experience of using ACT and cognitive behavioural therapy approaches may have enhanced their knowledge of processes such as psychological flexibility and intolerance of uncertainty. This knowledge may have contributed to the researcher becoming more attuned to language centred around avoidance, uncertainty and value-driven behaviour, which may have also influenced how the researcher interpreted the data. Descriptions of behaviour changes or shift in values may have been interpreted by the researcher as coping strategies to manage uncertainty, death anxiety or as processes associated with psychological flexibility.

A hand-written reflexive journal was kept throughout the analysis of data. It documented decisions and queries about coding, themes and interpretation and the researcher's emotional and physical responses to data. Additionally, it included reflections on how the researcher's background, experience, knowledge and assumptions may have influenced their engagement with the data. Additionally, regular research supervision offered a space for the researcher to discuss coding and development of themes, reflect on their positionality, question assumptions and explore alternative perspectives. These processes promoted reflexivity, supporting transparency and rigour whilst ensuring to embrace researcher subjectivity as a resource (Braun & Clarke, 2024).

While the researcher acknowledges that narrative synthesis is traditionally recommended within a critical realist stance, a meta-analysis was chosen to examine the strength and direction of association between PF and anxiety across populations for several reasons. A meta-analysis was chosen due to the number of available studies that met the inclusion criteria and the existence of prior meta-analyses in this area. This provided a foundation for this review to extend existing literature and address current limitations in research examining PF and anxiety. Meta-analysis is usually grounded in a positivist epistemology, which assumes an objective reality which is observable and can be discovered through scientific methods (Park et al., 2020). However, the researcher ensures not to assume fixed truths, acknowledging that findings are influenced by context and underlying mechanisms that may not be observed which is in line with critical realism. To support this, moderator and subgroup analyses were conducted to explore how contextual and methodological differences across studies may shape the observed associations.

1.2 Empirical Study Limitation: Sample

Throughout the study, the researcher made efforts to recruit a sample that was culturally diverse and equal amongst staff groups to ensure a breadth of perspectives. The researcher recognised the value of Patient and Public Involvement (PPI) and invited HCPs to collaborate in the study design, ensuring the PPI group was representative across backgrounds and occupational setting. Additionally, the researcher reached out to underrepresented groups through social media pages and network groups. However, the final sample did not truly reflect the diversity of the NHS workforce and there were uneven staff group representation. This is important to reflect on given that contextual and cultural factors may shape how an individual manages uncertainty, views death and levels of psychological flexibility. For example, in collectivist cultures, mortality of others generates anxiety, as not only does it remind the individual of the threat of death but can also impact how an individual views the world as an unpredictable and dangerous place (Gordillo et al., 2017). Additionally, cultural beliefs can influence how an individual makes meaning of health and illness and what becomes a motivating factor for behavioural and lifestyle changes; for example, in some Latin cultures, family relationships can be an important motivator for change (Nielsen-Bohlman et al.,

2004). Due to the underrepresentation of ethnicity and religion in the study, it may mean that these differences were not captured and can restrict the generalisability of the findings. Additionally in this study, HCPs working in oncology had the smallest sample size and included participants who reported the highest levels of exposure to death. This level of exposure may suggest they develop coping strategies that are different to other professionals to manage contextual stressors such as death and illness or may even become desensitised to death and illness cues (Baykan et al., 2021). A larger sample size for this group may have possibly allowed to detect and explore this in more depth.

Reflecting on barriers that may have prevented individuals from engaging with the study is essential so that future research can address these. Firstly, recruitment may have been constrained due to institutional policies in some services which required that participation took part outside of working hours. This may have discouraged engagement and may have felt like an additional burden. Support from organisations to provide protected time for research engagement would be of benefit. From a researcher's perspective, engaging with organisations through transparent and clear communication about research relevance, benefits, and aligning research with their values may also enhance their support. Second, mistrust of healthcare and research, concerns about discrimination and stigma, and study materials being only in English may have been additional barriers (Bodicoat et al., 2021). Researchers may have an important role in engaging and building relationships with community champions who can help endorse research (Pardhan et al., 2025) as well as ensuring study materials are accessible in other languages, for example using validated translated measures. The researcher also reflected on how additional PPI sessions may have supported issues with recruitment, however, they were also mindful how this may have placed additional pressure and strain on PPI members.

This chapter summarised the theoretical and methodological approaches to the thesis, whilst considering the researcher's ontological and epistemological position and exploring a key limitation related to the study's sample. The next chapter presents the systematic review which examines the association between psychological flexibility and anxiety.

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Chapter 2: Psychological Flexibility and Anxiety: A Systematic Review and Meta-Analysis

The journal *Clinical Psychology Review* was selected to guide the preparation of the manuscript. It states that manuscripts should follow American Psychological Association and not exceed 50 pages, including references, tables and figures.

https://www.sciencedirect.com/journal/clinical-psychology-review/publish/guide-for-authors

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7640 words (excluding abstract, tables, figures and references)

2.1 Abstract

The association of psychological flexibility (PF) with anxiety has been widely studied. However, issues with the measurement of PF raise some questions regarding the validity of the findings. Consequently, this meta-analysis aims to examine the association between PF and anxiety and examine potential moderators of the associations between PF and anxiety, while using a stringent set of PF measures. A literature search was conducted across five databases: CINAHL, Embase, MEDLINE, PsychInfo and Web of Science. Following removal of duplicates, 980 papers were screened by title and abstract and included if they reported an association between PF and anxiety. Correlation coefficients, study and sample characteristics were extracted from the included studies. A total of 29 studies yielded 31 effect sizes on the association between PF and anxiety. The results revealed a significant, moderate negative association between PF and anxiety (r = -.466, 95% CI [-0.52, -0.41]). Subgroup and meta-regression analyses showed that the PF instrument used, anxiety construct measured, and sample size moderated the relationship between PF and anxiety. Overall, the findings indicate that greater PF is associated with lower anxiety symptoms but that the measures of PF used influence results. This has implications for future research seeking to study PF and anxiety and is relevant to clinicians seeking to increase PF via psychological interventions.

Keywords: anxiety disorders, anxiety symptoms, psychological flexibility, mental health, meta-analysis

2.2 Introduction

Anxiety disorders, one of the most common mental health disorders, affect approximately 4.05% of the world's population with this trend continuing to rise (Javaid et al., 2023). This statistic does not account for individuals who do not present in services or experience subclinical anxiety symptoms, which can also contribute to economic burden (Haller et al., 2014). For the purpose of this review, the term 'anxiety' encompasses both anxiety disorders and symptoms. This aligns with the view that anxiety is considered to exist in a continuum of increasing severity (Zhong et al., 2024) and that subthreshold anxiety can have a significant burden on health services and impact psychosocial functioning (Karsten et al., 2013). Including both clinical and non-clinical samples increases the generalisability across the spectrum of anxiety severity. Additionally, it allows to account for variations in the observed associations between PF and anxiety, for example including only clinical samples may yield stronger associations due to greater symptom severity and reduced PF, whereas subclinical samples, may have less symptom severity and fewer functional impairments which may weaken the observed association (Gloster et al., 2011). Considering subclinical populations may support the development of preventative interventions to reduce the risk of developing full-scale anxiety disorders (Zhong et al., 2024), while including clinical populations may support PF as a target mechanism for therapeutic interventions. Anxiety can cause significant disability impacting physical health and psychosocial functioning, with individuals often reporting poorer quality of life (Wilmer et al., 2021), increased sickness absence and medical costs (Müller et al., 2021). Cognitive behavioural therapy (CBT) is the first-line treatment for anxiety disorders, in accordance with the National Institute for Health and Care Excellence (NICE; 2020) guidance. However, remission rates for individuals who complete CBT for anxiety is approximately 50% (Springer et al., 2018) indicating improvements in the treatment of anxiety are necessary to better address the diverse needs of clients. Understanding transdiagnostic factors associated with anxiety could facilitate the development of more targeted treatment and yield better treatment outcomes.

2.2.1 Psychological Flexibility

Psychological flexibility (PF) is a transdiagnostic construct operationalised as a state of being fully in contact with the present moment and adjusting behaviour accordingly to align with values, according to Hayes et al. (2013). PF consists of six interrelated processes (Hayes et al. 2012) including: (1) acceptance; willingness to embrace difficult thoughts and feelings without attempts to change them, (2) cognitive defusion; ability to observe thoughts without becoming stuck in them (3) contact with the present moment; fully engaging in the 'here and now', (4) values; identifying what is important and prioritising it, (5) self as context; having a flexible perspective when faced with adversity and (6) committed action; taking steps towards what truly is important to the self, even during experiences of discomfort. These six processes have been presented as a 'Hexaflex' in previous research (Hayes et al., 2006). Hayes et al. (2011) described three 'dyadic' processes which overarch the six processes of PF: being open (cognitive defusion, experiential acceptance); aware (present moment awareness, self-as-context); and active (values, committed action). Theoretically, it has been proposed that while psychological and emotional pain are natural human experiences, low psychological flexibility or inflexibility prevents individuals from adapting to difficult situations and causes additional, unnecessary psychological suffering (Kashdan & Rottenberg, 2010). Clinical interventions using Acceptance and Commitment Therapy (ACT) therefore seek to increase PF, which has been viewed as a mechanism of change in relation to ameliorating a range of adverse psychological outcomes (Macri & Rogge, 2024).

2.2.2 PF and Anxiety

Greater PF has been associated with lower levels of anxiety (Johns et al., 2022). In a non-clinical sample of 1035 participants in Switzerland, higher levels of PF significantly reduced the impact of threatening life events, daily stress and low social support on anxiety (Gloster et al., 2017), suggesting that PF may buffer the effect of stressors on anxiety. The role of PF in the treatment of anxiety disorders has shown to be important. For example, Ohse et al. (2021) found that PF

increased following an ACT-based treatment program for individuals with chronic pain and comorbid mental health disorders, and that it was significantly correlated with a reduction in general anxiety symptoms. This suggests that PF may be a modifiable transdiagnostic process variable linked to anxiety. Although, a negative association between PF and anxiety has been consistently reported, a three-level meta-analytic review of 24 studies found that the association between PF and anxiety differed depending on the type of PF and anxiety measure used (Yao et al., 2024).

Socio-demographic factors have shown to play an important role in the association between PF and anxiety. A meta-analysis review by Yao et al. (2024) examining the association between PF and anxiety found that the relationship was stronger for Australians than Europeans and Americans. This highlights potential cultural or contextual factors which may influence the strength of the association. Age has shown to also be an important variable, with higher levels of PF being reported in older adults (Plys et al., 2022; Okayama et al., 2024). These differences may be attributed to greater emotional awareness, acceptance (Shallcross et al., 2013), acquisition of more adaptive coping strategies and greater adaptability to difficult situations (López et al., 2022). Gender variations have also been found to be important in PF, in a study examining wellbeing in athletes, males were reported to have higher psychological flexibility compared to female athletes (Ronkainen et al., 2024). However, in another study, no significant gender differences between PF levels were found in a sample of participants diagnosed with cancer (Hulbert-Williams & Storey, 2015). These findings highlight the relevance of socio-demographic factors in understanding the relationship between PF and anxiety.

2.2.3 Recent Criticism of PF

In recent years, the concept of PF has come under scrutiny due to the varied definitions, lack of conceptualisation and poor psychometric properties of PF measures (Arch et al., 2022; Cherry et al., 2021; Doorley et al., 2020). The Acceptance and Action Questionnaire (AAQ; Bond et al., 2011; Hayes et al., 2004) has been widely used in papers examining PF but has demonstrated poor

construct validity (Tyndall et al., 2019) and may be better conceived as an indicator of general distress than PF (Wolgast, 2014). Its usage in PF-related research despite being a measure of inflexibility assumes that PF and inflexibility exist on a single continuum (Cherry et al., 2021). However, it is not clear whether these constructs operate independently, as opposites or overlap. Additionally, studies have examined PF by assessing only individual components of PF such as cognitive defusion and avoidance (Kaertner et al., 2021; Watanabe & Akechi, 2023). This may lead to certain aspects of PF being unassessed (Gloster et al., 2021) and an amplified or minimised reporting of the impact of PF on psychological health.

To address these limitations, new, more refined, tools have been developed to reflect the six core PF processes or the dyadic processes of PF. The Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2016) and Flexibility Index Test (FIT-60; Batink et al., 2012) offers a comprehensive assessment of all dimensions of the Hexaflex model with subscale scores across all dimensions. Both have demonstrated good psychometric properties and correlations with mental distress (Barrado-Moreno et al., 2025; Batink et al., 2012; Batink & Delespaul, 2015). In contrast, the Comprehensive assessment of ACT processes (CompACT; Francis et al., 2016) and Psy-flex (Gloster et al., 2021) are shorter and more concise measures of PF but both remain rooted in contextual behavioural science and the distinct ACT processes or overarching dyadic processes. They have demonstrated good psychometric properties across clinical and non-clinical samples (Francis et al., 2016; Gloster et al., 2021).

2.2.4 Previous Reviews

There are several comprehensive systematic and meta-analytic reviews documenting the associations between PF and a range of outcomes including work-related quality of life (Garner & Golijani-Moghaddam, 2021), functioning among chronic pain patients (Ding & Zheng, 2022) and mental health problems during the Covid-19 pandemic (Yao et al., 2024). Existing reviews have examined the association between PF and anxiety (Bijulakshmi & Balaji, 2024b; Yao et al., 2024) and

reported a significant negative association. However, both reviews included studies that used the AAQ. Additionally, Yao et al.'s (2024) meta-analysis focused specifically on studies conducted in the context of the Covid-19 pandemic (2020-2022), meaning the findings may be influenced by the unique stressors of the pandemic period such as increased health-related fears and uncertainty. Further, among the 16 studies only one was carried out in a clinical population, limiting the generalisability of the findings.

2.2.5 The Current Review

The current review aimed to synthesise studies examining the association between trait-level PF and anxiety, focusing on research which employed measures that aligned with either the six core PF processes or the broader dyadic model of PF. The current review adds to Yao et al.'s (2024) review, firstly it placed no restrictions on publication date, enabling the inclusion of a broader range of studies and providing insight into how PF relates to anxiety across time and context. Second, given the importance of understanding the relationship of PF and anxiety across populations, the current review includes studies conducted in clinical and non-clinical contexts to address the gap in the literature.

The research questions were as follows:

(1) is there an association between PF and anxiety?
(2) does the strength of the association between PF and anxiety differ depending on the measurement tool used to assess PF?
(3) how do sample characteristics (e.g. age, gender, sample, population, anxiety construct) moderate the relationship between PF and anxiety?

Consistent with past research, it was hypothesised there would be a significant negative association between PF and anxiety, and this will vary depending on the PF measure used. Given the exploratory nature of analysis related to the moderating variables, specific hypothesis for these were not specified.

2.3 Methods

To promote transparency, the Preferred Reported Items for Systematic Reviews and Meta-Analysis (PRISMA; Page et al., 2021) (See Appendix A) guidelines were adhered to. The protocol was registered on PROSPERO (CRD42024596536) in October 2024.

2.3.1 Search Strategy

Five databases were searched for this review: CINAHL, Embase, MEDLINE, PsychInfo and Web of Science in November 2024. Search terms were identified and reviewed by a specialist librarian at the University of Southampton Library. Keywords and subject terms were used for a comprehensive search of studies. No date restrictions were applied. A manual search which involved reviewing reference lists and forward citation tracking in Google Scholar to capture recent research was also employed to minimize missing relevant studies. The searches were rerun using the same search strategy in April 2025 to ensure any additional papers published since the original search date were included. Two additional eligible studies were identified and included in the meta-analysis.

The following terms were used to search for the relevant articles: ("Psychological flexibility" or "open and engaged state questionnaire" or "Multidimensional Psychological Flexibility Inventory" or PPFI or "FIT-60" or compact or psyflex) AND (Anxi* or GAD or "generali!ed anxiety disorder" or worry* or phobi* or "social anxiety disorder" or SAD or panic or hypochondria* or agoraphobi* or "health anxiety" or "illness anxiety").

2.3.2 Eligibility Criteria

Studies which met the following eligibility criteria were included: (1) quantitative study, (2) cross-sectional, prospective, longitudinal, randomised controlled trials, (3) written in English, (4) human participants aged 18 and over (4) published in a peer-review journal, (5) reported a baseline Pearson correlation between anxiety and PF, (6) used a standardised and validated trait-based measure of PF rooted in the six core processes or the overarching dyadic model of PF, (7) used a standardised and validated measure of anxiety.

Studies that used the following PF tools were included: MPFI – flexibility scale (Rolffs et al., 2016), FIT-60 (Batink et al., 2012), CompACT (Francis et al., 2016) and Psy-flex (Gloster et al., 2021). These measures were included as they measure the six processes of PF, or the dyadic process as described by Hayes et al. (2011) which encompasses the six core processes.

2.3.3 Exclusion Criteria

Studies which were only qualitative, reviews, conference extracts, single-case studies, grey literature and book chapters were excluded. Studies that only reported on symptoms of obsessive-compulsive disorder and post-traumatic stress disorder were excluded due to changes in diagnosis classification as per the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR; American Psychiatric Association, 2022). Studies that utilise idiographic measures of anxiety and PF were excluded. Studies that measured PI, used problem-specific measures of PF (e.g. pain, parenting) or measures not assessing the six processes or the dyadic model of PF were also excluded.

The Open and Engaged State Questionnaire (OESQ; Benoy et al., 2019) and Personalised Psychological Flexibility Index (PPFI; Kashdan et al., 2020) was initially included in the search terms, however, were later excluded. The OESQ was excluded as it is a state-based measure, capturing momentary fluctuations in PF and the current meta-analysis focuses on trait-level PF. The PPFI was excluded as it assesses PF to a self-identified goal, to which responses are anchored to, rather than measuring general patterns of PF.

2.3.4 Study Selection

Following the systematic search, citations including titles and abstracts were uploaded to Rayyan, a systematic review management platform tool (Ouzzani et al., 2016) and duplicates were removed. An initial screening by title and abstract was completed by the first author (JF), to ensure consistency and reliability an independent reviewer screened a subset (10%) of the screened papers. Remaining papers were then read at full-text by JF and the eligibility criteria applied, and 10% of the

full-text articles were reassessed by an independent reviewer. Any discrepancies that could not be resolved between JF and the independent reviewer, were planned to be reviewed by WD/AM, however 100% agreement was reached at both stages.

2.3.5 Data Extraction

The following data were extracted from included studies: author(s), year, country, sample size and type (e.g. community, university students, clinical), age, gender, ethnicity, socioeconomic status (SES), study design, recruitment method, PF tool, anxiety tool and correlation coefficients. For studies that did not report correlations for anxiety and PF at baseline, the relevant study authors were emailed to request the data. Only baseline data were extracted for longitudinal or prospective studies. For studies that reported multiple anxiety measures, study's aims were reviewed and the measure most appropriate to the aim was extracted. A second reviewer also independently extracted data from 10% of the included studies. Agreement was high, with only one discrepancy identified related to sample size, which was resolved upon review.

2.3.6 Quality Assessment

The appraisal tool for cross-sectional studies (AXIS; Downes et al., 2016) was used to assess the quality of cross-sectional studies. The Joanna Briggs Institute (JBI; Barker et al., 2024) critical appraisal checklist for quasi-experimental studies was used to assess the quality of pre-post studies with no control group, and JBI critical appraisal checklist for cohort studies (Moola et al., 2020) was used to assess longitudinal studies. A second reviewer independently quality-appraised 10% of the included studies and showed full agreement between reviewers.

2.3.7 Statistical Analysis

All analyses were conducted using Comprehensive Meta-Analysis (CMA) version 4 (Borenstein et al., 2022). Pearson's correlation coefficient *r* was the primary effect used to quantify the association between PF and anxiety, extracted from the studies. Given Pearson's *r* correlations are not normally distributed, correlations were converted to Fisher's transformation of *r*, prior to

conducting the meta-analysis. Following the meta-analysis, Fisher's z was converted back to *r* for the interpretation of the results. Cohen's (1992) guidance for the interpretation of effect sizes were followed, with Pearson *r* values of 0.10 being considered small, 0.30 moderate and 0.50 large. Due to expected heterogeneity across studies (e.g. sample size and populations, tools used and study designs), a random-effects model was used. Cochran's Q test was used to assess heterogeneity across studies, with statistical significance set at $p < .05$ and I^2 was calculated to indicate the extent of heterogeneity with 25% representing low, 50% moderate and 75% high (Higgins et al., 2003). Publication bias was assessed by visually inspecting funnel plots, Egger's regression test and Duval and Tweedie's (2000) trim-and-fill method.

For the analysis of categorical moderators such as PF measure, population type (e.g. clinical vs non-clinical) and study type, subgroup analyses were conducted using Knapp-Hartung adjustment (Knapp & Hartung, 2003) and setting statistical significance at $p < 0.5$. Continuous moderators such as age, sample size and publication date were analysed using meta-regressions with regression coefficients (β) and 95% confidence intervals and *p* values set at <0.5.

2.3.8 Sensitivity Analysis

To ensure the overall findings of the meta-analysis are robust, sensitivity analyses were performed (Higgins et al., 2024) excluding outliers, studies from non-Western countries due to limited representation and studies which used abbreviated or translated PF measures. Results were then compared to examine if findings remained consistent.

2.4 Results

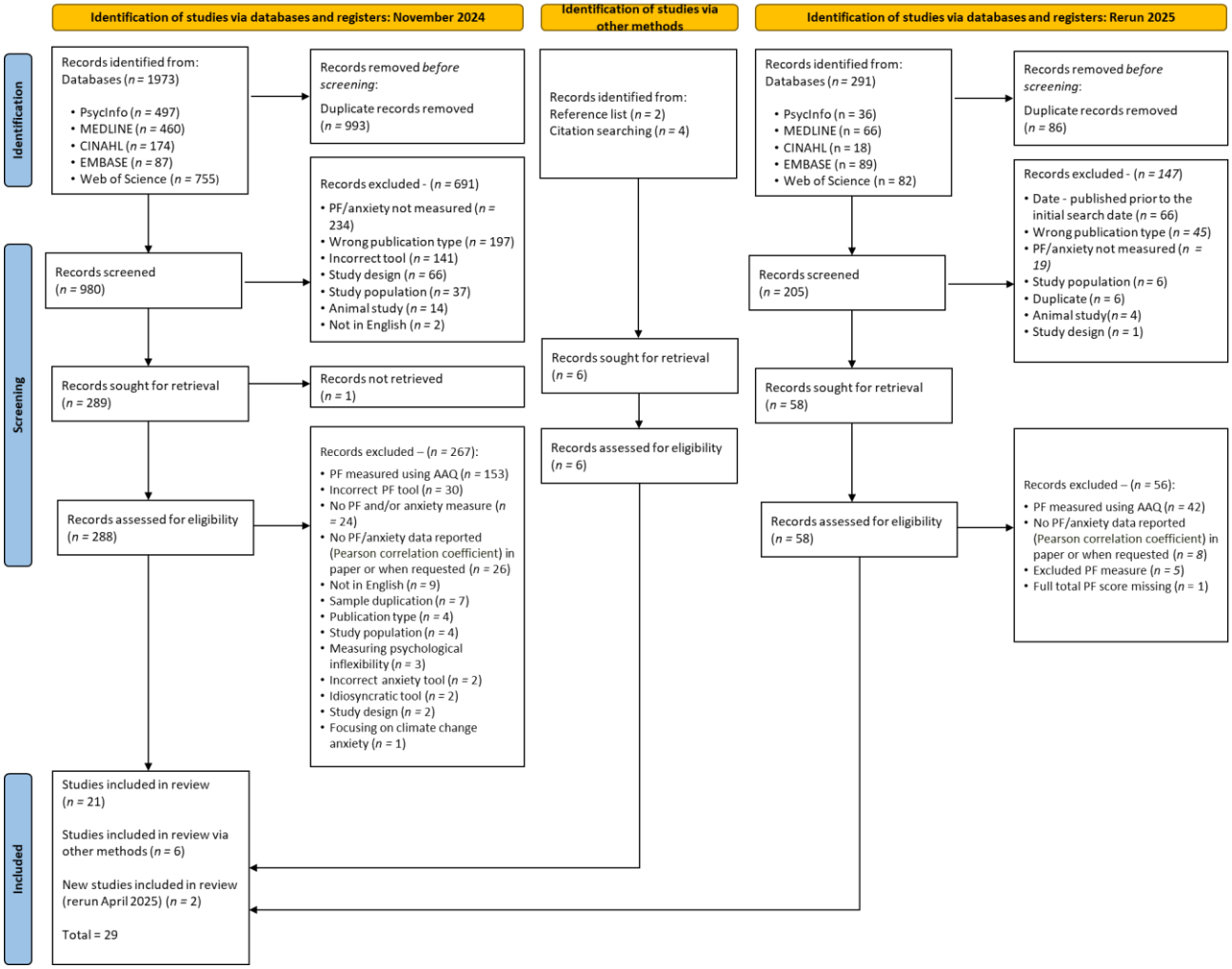
2.4.1 Study Selection

In total, 1,973 studies were identified in the comprehensive literature search, which reduced to 980 when duplicates were removed. Following the initial screening of title and abstract, 691 papers were excluded. The remaining papers were reviewed (*k* = 288*)* at full text after 1 exclusion due to the paper not being accessible to the researcher. For studies (*k* = 26) that did not report a

Pearson correlation coefficient, authors were contacted but some did not respond within the given timeframe or indicated that the requested data was not available, therefore these studies were excluded (*k* = 26). A total of 21 studies met the eligibility criteria. Forward citation tracking and review of reference lists identified six additional eligible studies which were included. A rerun of the database searches in April 2025 identified two additional studies. The final total of papers included were 29, see Figure 1 for PRISMA flowchart.

Figure 1

PRISMA flowchart of screening process



2.4.2 Study Characteristics

Study characteristics for included studies are summarised in Table 1. A range of designs were used including cross-sectional (*k* = 24), interventional (*k* = 4) and single-arm pilot (*k* = 1) studies. Publication dates ranged from 2016 to 2025. Studies were conducted mostly in Western countries (*k* = 23), with UK accounting for the largest number of studies (*k* = 7) followed by Portugal (*k* = 4) and Italy (*k* = 4).

The total number of participants for the included studies were 13,160, with sample sizes ranging from 28 to 1542 (*M* = 424.25, *SD* = 378.9). The mean age of participants ranged from 23.68 to 48 years. The majority of the studies (*k* = 26) had samples consisting of >50% female. Many studies did not report information on participant's ethnicity (*k* = 14). Studies where ethnicity was reported used inconsistent terminology, with studies reporting on ethnicity, race or nationality. Similarly, over half the studies (*k* = 16) did not report on SES and there was a lack of standardised reporting for studies which reported SES. Some studies described SES based on family income, annual or weekly income, education status, categorisations (e.g. low, middle, high SES) or used broad categories (e.g. much below average – much above average). Due to inconsistent reporting, it was not possible to reliably report and perform sub-group analyses on ethnicity and SES across studies.

Each study was rated as high, moderate or poor quality in accordance with the relevant quality assessment tool and are reported in Table 1. Cross-sectional studies were rated as moderate (*k* = 11) and high (*k* = 13) using the AXIS tool (Downes et al., 2016). Longitudinal studies (*k* = 4) and single-arm pilot (*k* = 1) were rated as moderate using the appropriate JBI tool (Barker et al., 2024; Moola et al., 2020).

Table 1

Summary of included studies in analysis

Authors	Location	Sample Size *(n)*	Mean Age	Gender (% female)	PF Measure	Anxiety Measure	Sample Population	Study design	Quality Appraisal
Azadfar et al. (2022)	Iran	307	29	73.6	MPFI - Persian	DASS-21	Non-clinical (general adult population)	Cross-sectional	High (AXIS)
Berglund et al. (2024)*	Portugal	104	39**	84.6	CompACT - Portuguese	HADS	Non-clinical (chronic illness, community sample)	Cross-sectional	High (AXIS)
Berglund et al. (2024)*	Portugal	166	35.3**	87.3	CompACT - Portuguese	HADS	Non-clinical (infected with Covid-19, community sample)	Cross-sectional	High (AXIS)
Bijulakshmi & Kumar (2024a)	India	80	24.19	46.3	MPFI	HAM-A	Clinical (adults with anxiety disorder)	Cross-sectional	Moderate (AXIS)
Browne et al. (2022)	Ireland	231	48**	88	Psy-Flex	DASS-21	Non-clinical (general population with varying ACEs)	Longitudinal	Moderate (JBI)
Carlson et al. (2024)	USA	853	42.65	87.8	CompACT-23	IDAS – social anxiety scale	Non-clinical (educators)	Cross-sectional	Moderate (AXIS)

Carvalho et al. (2024)	Portugal	209	35.4	86.1	CompACT-18 - Portuguese	HADS	Non-clinical (adults infected with Covid-19)	Cross-sectional	Moderate (JBI)
Chong et al. (2023)	Hong Kong & Switzerland	452	36.9	84.5	Psy-Flex	GAD-7	Non-clinical (frontline nurses)	Cross-sectional	Moderate (AXIS)
Dawson & Golijani-Moghaddam (2020)	UK	555	39.2	72	CompACT-8	GAD-7	Non-clinical (general adult population)	Cross-sectional	High (AXIS)
Dax et al. (2023)	Australia	92	34.8	0	CompACT-23	PROMIS	Clinical (men with testicular cancer)	Cross-sectional	High (AXIS)
Francis et al. (2016)	UK	337	31.34	74	CompACT-23	DASS-21	Non-clinical (general adult population)	Cross-sectional	High (AXIS)
Gorinelli et al. (2022)	Finland	76	24.95	69.7	CompACT-23	SIAS	Non-clinical (University students)	Cross-sectional	Moderate (AXIS)
Ilyas and Dawood (2024)	Pakistan	573	23.68	49	MPFI – Urdu	SIAS	Clinical (adults with a diagnosis of social anxiety disorder)	Cross-sectional	Moderate (AXIS)
Landi et al. (2020)	Italy	944	38.86	73.5	MPFI – PF scale	SHAI-18	Non-clinical (general adult population)	Cross-sectional	Moderate (AXIS)

Landi et al. (2021)	Italy	1542	38.6	70.6	MPFI – PF scale	GAD-7	Non-clinical (general adult population)	Cross-sectional	High (AXIS)
Landi et al. (2022)	Italy	569	39.77	78.21	MPFI – Italian	GAD-7	Non-clinical (general adult population)	Longitudinal	Moderate (JBI)
Li et al. (2025)	China	353	31.14	100	Psy-Flex - Chinese	GAD-7	Clinical (Women Who Experience Perianal Loss)	Cross-sectional	High (AXIS)
McCracken et al. (2022)	Sweden	1174	47.8	90.5	MPFI	GAD-7	Non-clinical (general adult population)	Cross-sectional	Moderate (AXIS)
Meek et al. (2022)	UK	628	60.66	70.9	CompACT-23	HADS	Clinical (adults with multiple scelorosis)	Cross-sectional	High (AXIS)
Neto et al. (2024)*	Portugal	660	35.5	74.6	Psy-Flex - Portuguese	DASS-21	Non-clinical (general adult population)	Cross-sectional	Moderate (AXIS)
Neto et al. (2024)*	Brazil	213	36.48	74.1	Psy-Flex - Portuguese	DASS-21	Non-clinical (general adult population)	Cross-sectional	Moderate (AXIS)
Pakenham et al. (2020)	Italy	1035	37.51	79.1	MPFI	GAD-7	Non-clinical	Cross-sectional	Moderate (AXIS)

							(general adult population)		
Paris et al. (2021)	UK	145	32.53**	70.3	CompACT-18	DASS-21	Non-clinical (special Educational Needs teachers and teaching assistants)	Cross-sectional	High (AXIS)
Rea et al. (2023)	Australia, Canada, Portugal, USA & UK	66	49.78	71.21	CompACT-23	DASS-21	Clinical (adults on Home Parenteral Nutrition)	Cross-sectional	High (AXIS)
Rickardsson et al. (2022)	UK	145	50.9	87	CompACT-23	DASS-21	Non-clinical (caregivers for individuals with acquired brain injury)	Cross-sectional	High (AXIS)
Thomas et al. (2022)	USA	827	37.5	53.8	MPFI	WI-6	Non-clinical (general adult population)	Cross-sectional	Moderate (AXIS)
Tian et al. (2023)	China	28	34.48	100	CompACT-23	GAD-7	Non-clinical (clinical nurses)	Single-arm pilot	Fair (NIH)
Tilburg et al. (2024)	Netherlands	340	52.83	61.8	FIT-60	DASS-21	Non-clinical (general adult population)	Longitudinal	Moderate (JBI)

Trindade et al., 2021)	Portugal	173	31.53	80.3	CompACT-Portuguese	DASS-21	Non-clinical (general adult population)	Cross-sectional	High (AXIS)
Tynan et al. (2022)	USA	178	29.15	61.8	CompACT-18	GAD-2	Non-clinical (active-duty militrary personnel)	Cross-sectional	High (AXIS)
Vasiliou et al. (2023)	UK	105	53.86	57	CompACT-23	GAD-7	Clinical (adults with a skin condition)	Cross-sectional	Moderate (AXIS)

Note. MPFI = Multidimensional Psychological Flexibility Inventory; CompACT = Comprehensive assessment of Acceptance and Commitment Therapy processes; FIT-60 = Flexibility Index Test-60; DASS-21 = Depression, Anxiety and Stress Scale – 21; HAM-A = Hamilton Anxiety Rating Scale; IDAS = Inventory of Depression and Anxiety Symptoms; HADS = Hospital Anxiety and Depression Scale; GAD = Generalised Anxiety Disorder Scale; PROMIS = Patient-Reported Outcomes Measurement Information System; SIAS = Social Interaction Anxiety Scale; SHAI = Short Health Anxiety Inventory; WI-6 = Whiteley Index-6; AXIS = Appraisal tool for Cross-Sectional Studies; JBI = Joanna Briggs Institute

*Study reported multiple correlations, which were independently analysed in meta-analysis.

**Studies that did not provide mean, midpoint of the range was used as an estimate of the mean.

2.4.3 Measures

The current review included studies with a validated PF and anxiety measure. Measures that were unvalidated and state-based PF measures were not included. Idiosyncratic (e.g. visual analogue scales, goal-based) measures were not included due to the lack of standardisation. For PF, the following measures were used in the 29 studies: CompACT (*k* = 15), MPFI (*k* = 9), Psy-flex (*k* = 4) and FIT-60 (*k* = 1). Several of these measures included validated short-form or translated versions (Table 1).

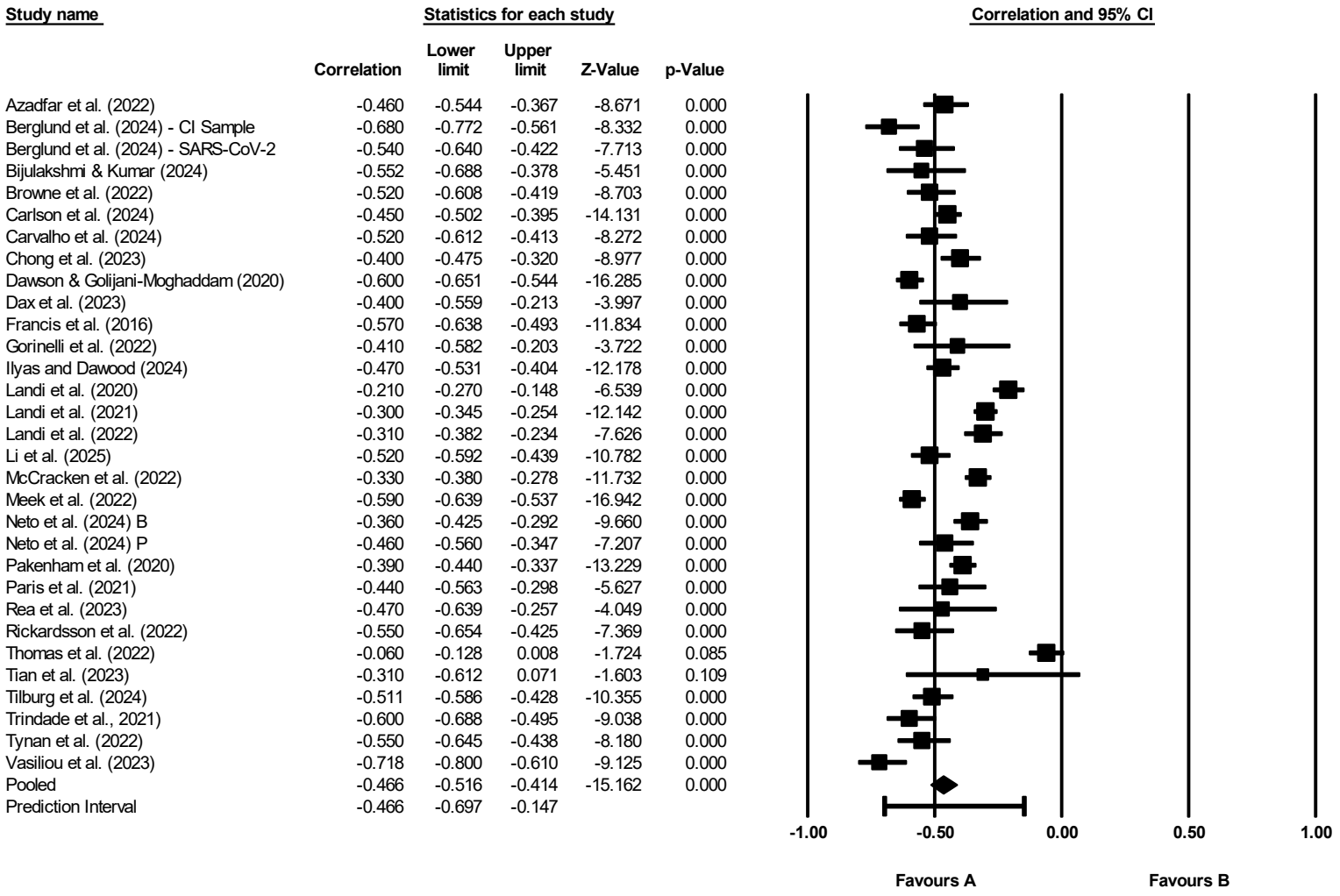
Anxiety was assessed using the following measures across the 29 studies: General Anxiety Disorder-7 (*k* = 9) (Spitzer et al., 2006), Depression Anxiety Stress Scale (DASS; *k* = 9) (Lovibond & Lovibond, 1995), Hospital Anxiety and Depression Scale (HADS; *k* = 3) (Zigmond & Snaith, 1983), Social Interaction Anxiety Scale (SIAS; *k* = 2) (Mattick & Clarke, 1998), General Anxiety Disorder-2 (*k* = 1) (Kroenke et al., 2007), Hamilton Anxiety Rating Scale (*k* = 1) (Hamilton, 1959), Inventory of Depression and Anxiety Symptoms (IDAS-II; *k* = 1) (Watson et al., 2007), Patient-Reported Outcomes Measurement Information System (PROMIS; *k* = 1) (Cella et al., 2007), Short Health Anxiety Inventory (SHAI; *k* = 1) (Salkovskis et al., 2002), Whiteley Index – 6 (*k* = 1) (Asmundson et al., 2008). For tools that included other constructs such as PI, depression and/or stress, only the subscales reporting on PF and anxiety were extracted and included in analysis.

2.4.4 Meta-analysis

The meta-analysis is based on 29 studies and 31 correlation coefficients. The results of the random-effects meta-analysis showed a significant negative association between PF and anxiety (r = -.466, 95% CI [-0.52, -0.41], z = -15.16, $p < .001$), with a moderate effect size (Cohen, 1992). Individual study effect sizes and the pooled estimate are presented in the forest plot (Figure 2). There was high heterogeneity across studies (Q = 391.67, $p < .001$; I^2 = 92%), indicating the variability between studies was not due to sampling error. The estimated between-study variance was T^2 = .03 in Fisher's Z, suggesting that variability in study characteristics may influence the association between PF and anxiety. Due to high heterogeneity across studies, moderator analysis was conducted to examine study characteristics.

Figure 2

Forest plots and statistics for the random-effects meta-analysis of the association between PF and anxiety

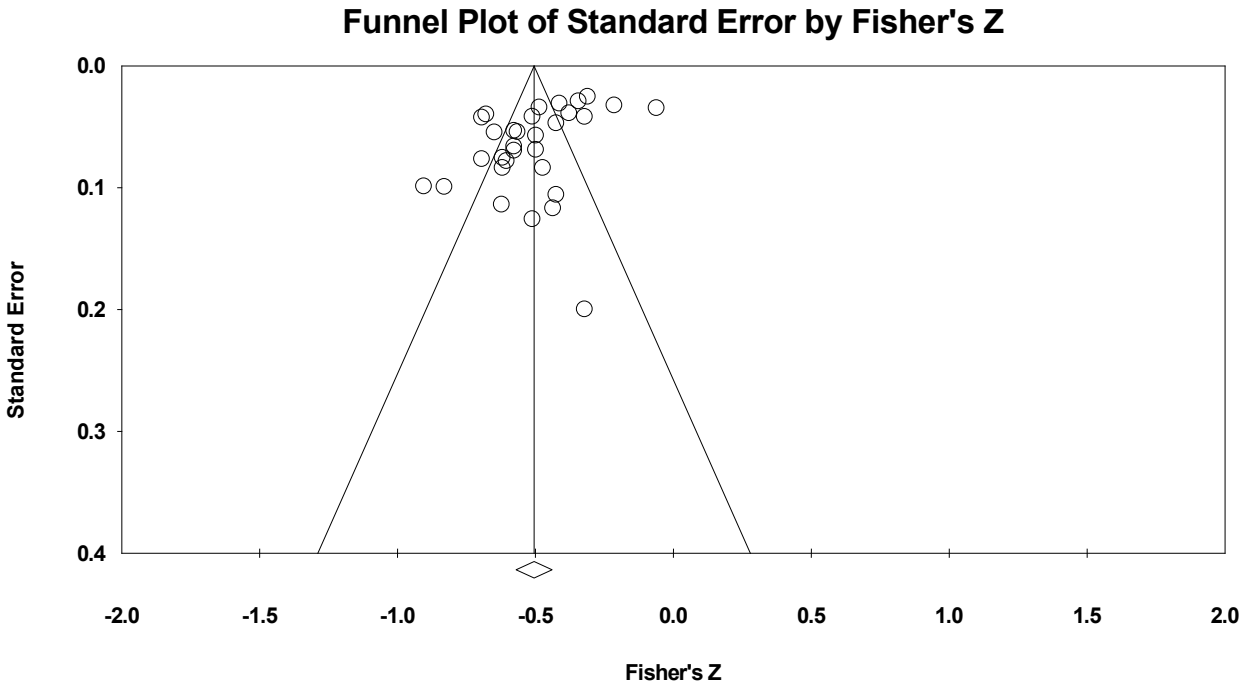


2.4.5 Publication Bias

To assess publication bias, a funnel plot (Figure 3) was visually inspected. A slight asymmetrical distribution of effect sizes was observed, with a slightly increased spread to the left of the mean. Egger test for bias was significant (t = 3.19, p = .003) indicating possible publication bias. Duval and Tweedie's (2000) trim-and-fill method were applied, no studies were "filled" to the left of the mean and 8 were added to the right of the mean. This suggests that studies which report a positive association or weaker negative correlation may be underrepresented. The Trim and Fill method observed value was calculated as r = -.40 and after including 8 studies to the right, the adjusted effect size decreased to r = .38. This suggests that despite possible publication bias the findings remain moderate and significant.

Figure 3

Funnel plot for meta-analysis of correlation between PF and anxiety



2.4.6 Moderator Analysis

A random-effects model with the Knapp-Hartung adjustment (Knapp & Hartung, 2003) was used for all moderator analyses given the high heterogeneity between studies. For categorical variables, subgroup analyses were conducted. A significant moderating effect of PF measures was found when comparing CompACT with all other PF measures grouped together ($F(1,29) = 14.41$, $p = .0007$), suggesting the association of PF and anxiety varied depending on the type of PF measure used. Further subgroup analysis where PF measures were ungrouped revealed the CompACT (intercept) had the strongest association between PF and anxiety (β= -.61, *SE* = 0.04, 95% CI [−0.68 - 0.53], $t(27) = −16.54$, $p < .001$). Compared to the CompACT, the MPFI had a significantly weaker association with PF and anxiety (β= .26, *SE* = 0.57, 95% CI [0.14 - 0.38], $t(297 = 4.6$, $p < .001$) and although not reaching significance the Psy-Flex also showed a weaker association (β= .12, *SE* = 0.07, 95% CI [−0.02 – 0.27], $t(27) = −1.76$, $p = .089$). The FIT-60 was not statistically different to the CompACT (β= .04, *SE* = 0.14, 95% CI [−0.24 - 0.33], $t(27) = 0.33$, $p = .746$). The overall model showed a significant moderating effect of PF measure ($F(3,27) = 7.14$, $p = .001$) on the association between PF and anxiety. PF measure explained 54% of between-study variance, however heterogeneity remained high ($I^2 = 92.34\%$).

Anxiety construct was also found to be a moderating variable in the association between PF and anxiety ($F(3,27) = 6.99$, $p = .001$), explaining 51% of between-study variance, heterogeneity remained high ($I^2 = 92.34\%$). Generalised anxiety disorder (β= .09, *SE* = 0.06, 95% CI [−0.03 - 0.20], $t(27) = −1.58$, $p = .126$) and social anxiety (β= .09, *SE* = 0.09, 95% CI [−0.09 - 0.28], $t(27) = 1.02$, $p = .317$;) did not significantly differ from general anxiety symptoms (intercept) (β= -.57, *SE* = 0.04, 95% CI [−0.65, -0.50], $t(27) = −16.01$, $p = .001$). However, health anxiety showed a significant weaker association between PF and anxiety (β= .44, CI [0.24 - 0.63], $t(27) = 1.02$, $p = .0001$) compared to general anxiety symptoms.

There were no statistically significant moderating effects of population type, categorised by clinical vs non-clinical samples (F(1,29) = 2,73, *p* = .109). The non-clinical group (reference group) demonstrated a significant moderate negative association between PF and anxiety (β= -.48, *SE* = 0.04, 95% CI [−0.55, − 0.41], *t*(29) = −13.58, *p* < .001) The clinical group did not significantly differ from the non-clinical group (β= -.13, *SE* = 0.08, 95% CI [−0.28 - 0.03], *t*(29) = −1.65, *p* = .109), suggesting similar patterns across groups. Following accounting for population type, heterogeneity remained high (I^2 = 92.34%) and the model only explained 14% of between-study variance. To examine gender as a moderator, the percentage of female participants was used due to a lack of gender-stratified data available. Meta-regression results indicated no significant effect of gender composition on the association between PF and anxiety (F(1,29) = .15, *p* = .70). Additionally, subgroup analyses showed no significant moderating effects based on study design (F(2,28) = .25, *p* = .78), region (Western, Non-Western and mixed) (F(2,28) = .13, *p* = .88) and study quality (F(2,28) = 2.73, *p* = .08). Gender, study design and region did not explain any between-study variance (R^2 analog = 0.00) whilst study quality explained 13%.

Meta-regression analysis found that publication year (F(1,29) = .19, *p* = .66) and age (F(1,29) = .67, *p* = .42) did not significantly moderate the association between PF and anxiety. Sample size was found to be a significant moderator (F(1,29) = 12.70, *p* = .001) with regression coefficient reported as β= .0003, *SE* = 0.0001, CI [0.0001 – 0.0004], *t*(29) = 3.56, p = .001, suggesting that as sample size increased there were weaker effect sizes. The model explained 32% of between-study variance, however residual heterogeneity remained high (I^2 = 92.34%).

2.4.7 Sensitivity Analysis

Visual inspection of a forest plot indicated that two studies had small effect sizes (Landi et al., 2020; Thomas et al., 2022), a sensitivity analysis was performed to assess the impact of the two studies on the overall findings. There was a slight increase in effect size (from *r* = -.466 to r = -0.487) and decrease in heterogeneity (from I^2 = 92 to 87%, T^2 = .017 in Fisher's Z units) however this

remained high. Additionally, removal of non-Western and mixed studies (N = 7) resulted in only a very slight increase in pooled effect size (*r* = -.472) and similar levels of heterogeneity (I^2 = 94%, T^2 = .036 in Fisher's Z units). Sensitivity analysis findings indicate that the inclusion of these studies only have a very small impact on the overall effect. Studies which used an abbreviated or translated measure of PF were removed from the analysis (*k* = 13). The overall pooled effect size remained similar (*r* = -.462), and heterogeneity remained high (I^2 = 93%, T^2 = .036 in Fisher's Z units), indicating inclusion of studies with shorter or translated measures has little impact on the overall findings.

2.5 Discussion

There is increasing attention in the role of PF across mental health conditions, especially anxiety. However, recent research has criticised the way PF has been measured and its conceptualisation. The present meta-analysis sought to (1) examine the association between PF and anxiety, (2) examine whether this association varied based on the measure of PF used and (3) whether sample and/or study characteristics moderate the association between PF and anxiety. Overall, 31 correlation coefficients reported from a total of 29 studies, across 17 countries and 13,160 participants, were included in the meta-analysis. There was a significant negative association between PF and anxiety with an overall moderate effect size (*r* = .466). This indicates that higher levels of PF are associated with lower anxiety levels, which is consistent with the study's hypothesis and supports previous studies which found a negative association between the two (Chong et al., 2023; Paris et al., 2021). Additionally, the findings from the current review align with and build on Yao et al's (2024) meta-analysis review, providing further evidence for a robust negative association between PF and anxiety, and extending previous work by incorporating a greater number of clinical samples and a wider publication period.

The findings build on the existing literature of PF and anxiety, where PF has been shown to be malleable and be improved via interventions like ACT in which the six processes underpinning PF are targeted, resulting in decreased anxiety (Dindo et al., 2017). One potential interpretation of

these findings may be that being open, aware and active (Hayes et al., 2011), increases flexible thinking and adaptive responses in the face of distressing experiences (Wang et al., 2023). In contrast, individuals who frequently use avoidance, disengage from valued actions and struggle to tolerate unpleasant internal experiences may be more susceptible to increased anxiety (Hayes et al., 2006; Kashdan & Rottenberg, 2010).

Similarly to the findings of Yao et al. (2024), a significant moderating effect of PF measure was found in the association between PF and anxiety. This is consistent with previous literature where Cherry et al. (2021) reported that the choice of PF measure is important and can impact study findings. These findings showed that the association between PF and anxiety was strongest in studies using the CompACT compared to the MPFI. This highlights that even though these measures of PF align with the theoretical underpinnings of PF, they may differ in how they measure its association with anxiety. A possible explanation for these differences may be related to the context of how these measures were validated. The CompACT has been commonly applied across clinical and non-clinical samples (Francis et al., 2016) compared to the MPFI which was developed and validated in a non-clinical sample such as university students (Rolffs et al., 2016), where anxiety symptoms and PF processes may be less pronounced or related to contextual or situational factors (Malo et al., 2022). Additionally, Barrado-Moreno et al. (2025) examined the psychometric properties of the MPFI-24 and found that the six PF processes did not load onto a higher-order factor structure. This suggests that they may function independently and not as a single overarching PF construct. Despite this finding relating to a short-form version of the MPFI, it may help to explain the weaker association between PF and anxiety found in the moderator analysis, which included all MPFI scales. Additionally, findings from Yao et al.'s (2024) review also suggested weaker associations between PF and anxiety when using the MPFI compared to the AAQ-II, which may suggest that certain measures may be more sensitive to key processes such as experiential avoidance and cognitive fusion, which are particularly salient in anxiety.

Differences of structural constructs between the measures (unidimensional vs multidimensional), length and scoring may also partly explain the differences. The FIT-60 and Psy-flex had a comparable effect size to the CompACT, but the Psy-Flex showed a weaker association with anxiety. This is an interesting finding, since the FIT-60 shares similarities with the MPFI such as multidimensional construct and length and the Psy-Flex with the CompACT (length of measure). However, this should be interpreted with caution and strong inferences should not be made as very few studies used the Psy-Flex (*n* = 4) and only one used the FIT-60, which may have resulted in reduced statistical power to observe differences.

The meta-analysis found no moderating effect of region (Western vs. Non-western), suggesting that the association between PF and anxiety may be consistent across cultures. This is not entirely surprising as research has shown that theoretical underpinnings of PF are shared across Eastern cultures for example, cultural concepts based on Daoism and Buddhism emphasise acceptance, being present and letting go of what cannot be controlled (Perry et al., 2024). However, only six of the studies reported in this meta-analysis were conducted in non-Western countries, which may reduce the ability of detecting cultural differences given lower statistical power. Additionally, an issue in the current literature was the inconsistent (or lack of) reporting of ethnicity, race and SES. Some studies used race and ethnicity interchangeably and often, SES was measured in distinct ways (e.g. income, education or class system). The lack of consistent reporting makes it difficult to compare findings across these demographics, questioning the generalisability of the findings across populations.

Whilst direct comparisons across gender could not be made due to the lack of gender-stratified outcome data available, the percentage of female participants did not moderate the relationship between PF and anxiety. This contradicts previous research, which has found gender-specific differences (Ronkainen et al., 2024; Yao et al., 2024). However, there are inconsistent findings (Bijulakshmi & Kumar, 2024a; Hulbert-Williams & Storey, 2015) in the literature of the moderating role of gender in the association between PF and anxiety. The finding from the current

paper might be due to the over-representation of female participants, which may potentially mask significant effects and bias the pooled effect size. The variability in findings may pose important questions on how gender and sex are operationalised in research. Often, sex and gender are conflated and reported using dichotomous variables (male/female or woman/man) (Lindqvist et al., 2020), which was observed across studies reported in this paper. This may potentially result in researchers overlooking meaningful within-group differences and failing to detect gender-specific effects, for example if the association between PF and anxiety is moderated by gender due to societal expectations or gender roles norms.

Further, the present paper found no significant difference in the association between PF and anxiety across clinical and non-clinical groups. This contrasts with Yao et al's (2024) review, which reported a significant moderating effect of sample type, with stronger associations reported in clinical samples. However, the inconsistency in findings may be attributed to the limited representation of clinical samples in Yao et al., (2024) review (k = 1).

The anxiety construct measured (e.g. general anxiety symptoms, health or social anxiety, GAD) did moderate the strength of the association. General anxiety symptoms, social anxiety and generalised anxiety disorder showed stronger associations between PF and anxiety compared to health anxiety. This aligns with research by Landi et al. (2020) which found that global PF may not influence health anxiety but may play a protective role in decreasing the adverse effects of trait health anxiety on mental health (e.g. depression, generalised anxiety disorder, stress). Sample size was found to moderate the association between PF and anxiety, with larger samples showing a slightly weaker association between PF and anxiety. This may be because smaller studies may present with inflated associations due to methodological issues, sample variability, less exploration of heterogeneity (Yang & Berdine, 2023). Additionally, the tendency to not publish non-significant findings can lead to publication bias (Linden et al., 2024).

No significant moderating effect of age between PF and anxiety was detected, indicating that this relationship is consistent across the examined age groups in this paper. This contradicts previous research which found PF to increase with age (Okayama et al., 2024). However, this may be due to the mean age range (23.68 to 48 years) of participants in this study which limits the generalisability of findings to younger (18-22 years) and older adults (65+ years). Further, study design, study quality and publication date did not moderate the association between PF and anxiety. All but one study (Francis et al., 2016) was published from 2020 onwards, which may have prevented the detection of meaningful differences over a longer period. It is, however, noteworthy that the relationship between PF and anxiety remained stable across publication years even in the context of the Covid-19 pandemic, a period characterised by heightened psychological distress and uncertainty (Di Blasi et al., 2021). This can provide some evidence for the buffering role of PF in anxiety, enabling individuals to respond more flexibly by increasing awareness, openness and commitment to actions in line with their values, to manage challenging and threatening environments (Kashdan & Rottenberg, 2010).

2.5.1 Limitations

When interpreting the findings of this review, several limitations should be considered. First, most of the studies used a cross-sectional design, therefore preventing causal conclusions and an issue of reverse causality. Whilst PF has been conceptualised as a protective factor for anxiety (Gloster et al., 2017), it is also plausible that lower PF is a by-product of high anxiety. Anxiety symptoms such as excessive worry, thought suppression and avoidance of threatening stimuli (Nasiri et al., 2019) may make it difficult for an individual to be in contact with the present moment and to take deliberate action towards valued goals. These are core PF components and can impact on an individual's ability to respond flexibly. Though some studies have employed a longitudinal cohort design (Carvalho et al., 2024; Landi et al., 2022), issues with attrition rate and a lack of PF measurement at all timepoints were observed. Therefore, future studies should aim to explore how PF may change over time and its impact on the development and maintenance of anxiety.

Second, the exclusion of studies not written in English may have led to published papers in other languages being overlooked, affecting the cross-cultural applicability of findings and increasing systematic bias. Third, the high heterogeneity across the studies stemming from differences in sample characteristics, study design and measurement tools may make it difficult to draw concrete conclusions. However, the researchers account for heterogeneity by quantifying it using Cochran's Q test, I^2 statistic and employing a random-effects model.

2.5.2 Clinical Implications and Future Research

The current review offers valuable implications for the management of anxiety both in clinical and non-clinical samples. This study showed that higher levels of PF are associated with lower levels of anxiety across population groups, emphasising the important role of PF as a transdiagnostic process and/or protective mechanism in anxiety. Interventions targeting PF, which is considered as malleable (Gloster et al., 2017), seem promising in reducing anxiety symptoms. ACT interventions have found to be an effective treatment in alleviating anxiety symptoms and improving PF in non-clinical samples such as in health care professionals experiencing psychological distress related to work (Zhang et al., 2024) and family caregivers of people with dementia (Atefi et al., 2025). Studies have also found ACT to be effective in improving anxiety symptoms and PF in clinical samples for example individuals with fibromyalgia (Luciano et al., 2014), type II diabetes (Fayazbakhsh & Mansouri, 2019), generalised anxiety disorder (Dahlin et al., 2016) and general anxiety (Ohse et al., 2021). These findings have been replicated across non-western cultures such as in Iran (Mohabbat-Bahar et al., 2015) and China (Zhao et al., 2022).

Although the meta-analytic findings found a robust negative association between PF and anxiety, it should be interpreted cautiously since key challenges on how to clearly operationalise and measure the core qualities and processes of PF and how they interrelate exist (Vlaeyen, 2014, Cherry et al., 2021). Additionally, PF has gained much attention with the increased popularity of ACT (Rutschmann et al., 2024), however elements of PF are also reflected in other models. Arch and

Craske (2008) highlighted that although ACT and CBT use different techniques (e.g. restructuring vs. defusion), they both aim to reduce experiential avoidance, promote exposure and encourage flexible, adaptive thinking to increase PF. Salkovskis et al. (2024) proposed PF as a mechanism of change in CBT, suggesting that individuals are stuck in problematic thinking which causes distress. The use of core CBT strategies such as collaborative formulation and the testing of 'Theory A vs Theory B', support individuals to develop more flexible ways of thinking, promoting more adaptive behavioural responses. The overlap of PF across theoretical approaches, may suggest the need for clearer conceptualisation, with measures that are relevant across therapeutic frameworks.

This supports the use of Process-Based Therapy (PBT; Hayes et al., 2022; Hayes & Hofmann, 2018) which suggests moving away from disorder-specific models, and instead addressing biopsychosocial processes such as PF via functional and idionomic approaches. A PBT approach, provides clinicians an opportunity to draw strategies from different approaches (e.g. CBT, ACT, compassion-focused therapy) if they target PF in the context required. This is supported by evidence, which has shown that cognitive restructuring techniques used in CBT may work better than ACT techniques at increasing PF in individuals with social phobia who are experiencing high levels of experiential avoidance (Craske et al., 2014). Additionally, the current paper highlighted that anxiety construct influenced the association between PF and anxiety, with health anxiety showing a weaker association between PF and anxiety. This warrants further research into understanding the role of PF in various anxiety populations such as health, panic, social anxiety and generalised anxiety disorder. Understanding if and which specific PF processes are related to specific anxiety presentations is important and can provide important considerations for the development of anxiety treatments. It may also shed light on whether specific PF measures are better suited at assessing PF with specific anxiety presentations.

The CompACT measure of PF had the strongest moderating effect between PF and anxiety, highlighting its utility across clinical and research contexts. The CompACT compared to other measures such as FIT-60 and MPFI, offers a briefer measure of key PF components, and its validation

in clinical settings suggests it may be more sensitive to detect meaningful change. Context-specific and idiographic measures of PF such as the PPFI (Kashdan et al., 2020) and state-level measures like the OESQ (Benoy et al., 2019) were excluded in this review. Although, PF has traditionally been considered as a trait process, there is ongoing debate whether PF could be a dynamic process evolving over time and across contexts (Malo et al., 2022). Future research should consider incorporating measures that can assess the dynamic process of PF to increase theoretical understanding of PF and allow for better tailoring of anxiety interventions.

The poor reporting of sociodemographic information such as gender, SES, race and ethnicity across studies limited the ability to draw meaningful conclusions about differences within groups. It would be of utmost importance for more inclusive, consistent and standardised reporting of sociodemographic information, which should be considered when designing the study to ensure demographic surveys are meaningful and representative of diverse populations (Burnette et al., 2022; Wilson, 2024). Additionally, most of the studies in this meta-analysis were conducted in Western countries, with predominantly female samples. Future research should aim to recruit larger samples with greater diversity to increase the generalisability of results.

To advance the field of PF, several conceptual and methodological issues should be addressed. Notably, the lack of consistent operationalisation of PF continues to exist. The definition of PF has an emphasis on open awareness, experiential acceptance and values-driven action (Hayes et al., 2011) as a response to distressing events or emotional experiences; however, it is argued to overlap with other well-established constructs such as mindfulness, cognitive flexibility and emotion regulation (Cherry et al., 2021). The blurring between PF and other constructs raises concerns and future research should clearly define the conceptual distinction between PF and related constructs. However, overlaps between PF and other constructs may be due to issues with measurement rather than a true theoretical overlap, therefore future research should aim to evaluate the psychometric properties of PF and related constructs. This can help refine current PF measures and retain the

strengths of these tools such as clinical relevance and accessibility, while ensuring they are more accurately and uniquely capturing the construct.

Further, examining the six core processes of PF separately would help determine whether some processes are more clinically useful than others, more strongly linked to anxiety symptoms or more responsive to change. Additionally, some PF processes may be more relevant to specific anxiety presentations than others and aggregating all PF processes into a singular score may obscure specific mechanisms that impact different types of anxiety. Therefore, examining the sub-processes of PF and anxiety, would allow not only to investigate the strength of PF and anxiety, but also help develop more refined and tailored psychological interventions.

Finally, this study excluded studies of participants under the age of 18. The abundance of research and measures of PF (Soares et al., 2023) are primarily focused on adult populations, despite anxiety disorders being the most common mental health condition in children and adolescents (Kowalchuk et al., 2022). Future research should consider exploring the role of PF in anxiety in children and adolescents and whether interventions targeting PF may be beneficial for this demographic group.

2.6 Conclusion

The present meta-analysis examined the association between PF and anxiety, examining whether the strength of association is moderated by type of PF measure used and other study and sample characteristics. Our findings indicate a significant negative association between PF and anxiety with a moderate effect size. A series of moderator analyses revealed that the association between PF and anxiety is stronger when using the CompACT compared to the MPFI, varies by the type of anxiety construct and sample size. Study characteristics based on design, quality, publication date and region did not moderate the relationship. Further, sample demographics related to age and population type also did not moderate the association between PF and anxiety. Future research

should examine the role of PF across specific anxiety presentations to inform meaningful interventions.

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Chapter 3: A Mixed-Methods Cross-Sectional Study of Health Anxiety across Healthcare Professionals

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3.1 Abstract

Studies have shown a high prevalence of health anxiety (HA) in healthcare professionals (HCPs), which can impact staff wellbeing and high-quality patient care. This study aimed to assess the prevalence of HA in HCPs, compare it across staff groups in physical and non-physical settings and explore psychological predictors of HA in HCPs. Further, the present study aimed to qualitatively explore lifestyle or behavioural changes related to the nature of their job. A cross-sectional mixed-methods online survey was conducted. Quantitative measures included the SHAI-18, HADS, DAS, IUS-12 and Psy-Flex. Descriptive statistics, between-group analysis, hierarchical multiple regression and thematic analysis were conducted. Prevalence of HA across the sample was 36.9%, HCPs working in oncology reported the highest prevalence (44.8%). However, there were no significant differences between staff groups. Death anxiety and psychological flexibility were revealed as significant predictors of HA after controlling for clinical exposure to terminal or life-limiting illness. Three overarching themes were generated from the thematic analysis: (1) health consciousness; (2) shifting values, perspectives and acceptance; and (3) workplace stressors and coping. The findings from this study demonstrate the value of process-based interventions to support HCPs experiencing existential concerns and increasing psychological flexibility. Future research should replicate these findings in larger samples.

Keywords: healthcare workers, health anxiety, psychological flexibility, death anxiety, intolerance of uncertainty, mortality salience

3.2 Introduction

Healthcare professionals' (HCP) psychological wellbeing has been an increased area of concern (Bamforth et al., 2023) and has led to a mounting increase in research in recent years. Staff exhaustion, low morale and high workloads are often cited as factors contributing to low psychological wellbeing (O'Connor et al., 2018) contributing to the current crisis in recruitment and staff retention (Khan, 2023). Poor wellbeing in HCPs can affect patient outcomes and the delivery of safe, high-quality care (Kirk, 2024). Although each healthcare context is presented with unique challenges and pressures, some HCPs may be at higher risk of developing mental health problems. For example, exposure to distressing events may make HCPs more vulnerable to experiencing post-traumatic stress symptoms (de Boer et al., 2011; Milasan, 2025). In a study of 162 trainee surgeons in the UK, most reported they had been exposed to a patient's death or cardiac arrest and 16% reported experiencing symptoms consistent with post-traumatic stress disorder or acute stress response (Thompson et al., 2017). HCPs working in oncology and neurorehabilitation are often faced with challenges that may be less common across other specialities including exposure to death, severity and chronicity of injury, working with uncertainty, sharing bad news, treatment failure, patient suffering and slow patient progress (Chambers-Baltz et al., 2023; Langenaeken & Rombouts, 2014; McFarland et al., 2019). Additionally, research has found that HCPs such as nurses working in high-risk areas such as oncology are at greater risk for burnout (Rushton et al., 2015), which has shown to be correlated with depression and anxiety (Papathanasiou, 2015).

Depression and anxiety symptoms are highly prevalent in HCPs (Fernandez et al., 2021), however, there is very little research of HCPs experience of health anxiety (HA) in England. HA, also referred to as illness anxiety and previously known as hypochondriasis, is characterised by excessive preoccupation of developing an illness (American Psychiatric Association [APA], 2013). HA is common and often underdiagnosed (Tyrer & Tyrer, 2018) and is often conceptualised as existing on a continuum, where symptoms range from mild and transient anxiety to severe (Lebel et al., 2020).

Negative interpretation of bodily sensations or changes can often lead to health-related checking behaviours or maladaptive avoidance (Olatunji et al., 2011). This can have a debilitating effect on an individual's social and occupational functioning, and overuse of healthcare services (Asmundson & Fergus, 2019). Learning experiences such as exposure to illness, the death of a loved one or a significant threat to health can manifest symptoms of HA (Barsky, 1999). This is particularly relevant as HCPs working in neurorehabilitation and oncology services often care for patients with high levels of emotional and physical demands, due to the severity and chronicity of their condition and who may be dying (Chambers-Baltz et al., 2023; Granek & Nakash, 2022). A study conducted in China across 13 hospitals and a sample of 1702 medical professionals found HA to be common, with prevalence of 30.14% (Chen et al., 2019). Similarly, Saeedi et al. (2022) found high levels of HA across 522 HCPs working in Iranian hospitals during the Covid-19 pandemic, possibly due to unknown disease trajectory and high rate of mortality, challenges also faced by HCPs working in oncology and neurorehabilitation services. High levels of HA contribute to higher distress and negatively impact on an individual's psychosocial functioning including employment (Asmundson et al., 2019; Eilenberg, Frostholm, et al., 2015), therefore it is necessary to understand individual factors and underlying mechanisms that may increase the risk of developing HA.

3.2.1 Demographic and Clinical Factors

Predisposing factors such as anxiety sensitivity and depression may underlie HA (Rachman, 2012), however findings are inconsistent, with some research suggesting that HA is more strongly related to anxiety than depressive symptoms (Scarella et al., 2016). Anxiety and depression may share transdiagnostic mechanisms with HA such as psychological flexibility (McCracken et al., 2021) and intolerance of uncertainty (Carleton et al., 2012), and are therefore important to consider when examining HA.

Various factors such as working years, personality, and education have shown to be predictors of HA in HCPs (Chen et al., 2019). Other predictors of HA have been found in the general

population such as gender, with women showing higher HA symptoms compared to men (Alioğullari et al., 2022; Kirmizi et al., 2021). Furthermore, high exposure to patients with severe illnesses can be a predictor of poor wellbeing. Saban et al. (2013) found that HCPs who were caring for veterans with traumatic brain injury >50% of their time, reported higher emotional exhaustion than HCPs who reported less time. These variables are of interest and should be considered when investigating HA in staff groups.

3.2.2 Intolerance of Uncertainty

HCPs are often faced with unpredictable and uncertain situations such as disease trajectory (Hlubocky et al., 2016), treatment decisions and diagnosis. HCP's ability to tolerate uncertainty has important consequences in the delivery of healthcare for example decision making, forming relationships and can also impact on health behaviours (Hillen et al., 2017). Intolerance of uncertainty, as described by Carleton (2012) is the fear of the unknown and viewing ambiguous situations as threatening. Intolerance of uncertainty can provoke a range of responses varying from a cognitive, behavioural and emotional level. Uncertainty can bring up feelings of fear and distress, negative beliefs around coping, avoidance, reassurance-seeking, increased checking behaviours and excessive planning (Robichaud et al., 2019). Individuals with HA can experience uncertainty when a new, unknown bodily sensation is felt and lead to catastrophic health appraisals such as death (Furer & Walker, 2008) which can elicit anxiety. This may be further exacerbated in HCPs working with patients with life-limiting illnesses for example, if an HCP experiences a bodily sensation, they may associate it to a specific illness they know more about due to their work and clinical knowledge.

Intolerance of uncertainty has been associated with higher levels of HA in the general population during the Covid-19 pandemic (Sohrabzadeh-Fard et al., 2021; Tull et al., 2020). Bredemier et al. (2023) collected data from an international sample and found that intolerance of uncertainty predicted HA during the Covid-19 pandemic, citing intolerance of uncertainty as a risk factor for HA. Another study of 428 medically healthy college students found a moderate

relationship between intolerance of uncertainty, catastrophic health appraisals and HA (Fergus & Valentiner, 2011). These findings demonstrate the role of intolerance of uncertainty in HA, however, many studies focused on its role during the Covid-19 pandemic and to the researcher's knowledge there are no studies focusing on intolerance of uncertainty and HA in HCPs. Therefore, research in this area is warranted.

3.2.3 Psychological Flexibility

Psychological flexibility has been considered to possibly mitigate the risk of the development of mental health illness. The concept of psychological flexibility underpins acceptance and commitment therapy (ACT) theory (Doorley et al., 2020) and has six core processes; contact with the present moment, values, committed action, self as context, defusion and acceptance (Hayes et al., 2006). The definition of psychological flexibility has come under some scrutiny (Kashdan & Rottenberg, 2010), possibly due to interchangeable terms used and similarity in processes (Cherry et al., 2021). This research defines psychological flexibility as responding to situations in line with personal goals and values, being present in the moment even when experiencing distressing internal experiences (thoughts, emotions) (Hayes et al., 2012). HCPs often deal with challenging situations as part of their role, psychological flexibility may be a protective mechanism as HCPs may feel better able to respond to these situations with values-based actions rather than a need for control, avoidance and rumination (Chong et al., 2023).

Psychological flexibility has shown to negatively correlate with burnout in nurses (Kent et al., 2019), depression and anxiety (Masuda & Tully, 2011) and HA in non-clinical samples (Masuda & Tully, 2011; Thomas et al., 2022). Dawson and Golijani-Moghaddam (2020) found a negative association between psychological flexibility and distress, and a positive relationship with wellbeing in UK adults during the Covid-19 pandemic. When examining the mediating factors of perceived illness threats of Covid-19 on mental health (emotional, social and psychological wellbeing) in a sample of 514 adults in Hong Kong, Chong et al. (2023) found psychological flexibility mediated this

relationship. A meta-analysis of nine studies found that HCPs who reported higher psychological flexibility also reported lower levels of compassion fatigue and higher compassion satisfaction (Garner & Golijani-Moghaddam, 2021). Studies examining ACT interventions which target psychological flexibility (Hoffman, Rask, & Frostholm, 2019) have found improvements in HA symptoms in adults (Eilenberg, Fink, et al., 2015; Hoffmann, Rask, Hedman-Lagerlöf, et al., 2019) demonstrating the possible role it plays in HA. Understanding the role of psychological flexibility in staff wellbeing, specifically HA may provide value when considering work-related initiatives for improving staff wellbeing.

3.2.4 Death Anxiety

Death anxiety which relates to the fear of death, has been argued to be a transdiagnostic construct which underlies many mental health conditions (Iverach et al., 2014; Menzies et al., 2022). Human's natural biological instinct to survive and cognitive awareness that death is certain and potentially imminent poses an existential dilemma which can contribute to feelings of vulnerability (Arndt & Vess, 2008; Becker 1971). Perhaps unsurprisingly, death anxiety has been considered as an underlying construct of the development and maintenance of HA (Furer & Walker, 2008) that is significantly correlated with HA (Menzies et al., 2019). In a study of 162 general medical outpatients, Noyes et al. (2002) found that fear of dying, loss of meaning and fear of separation were highly correlated among patients with HA. Similarly, concerns related to death have been found to be higher in individuals with HA than in those without (Kellner et al., 1987). Another study found that death anxiety symptoms increase at a higher rate when HA symptoms also increase (Alioğullari et al., 2022). A review examining the association between death anxiety and HA found that out of nine studies, all found a positive association between the two (aan de Stegge et al., 2018). This may be particularly important for HCPs working in neurorehabilitation or oncology inpatient services, who are often exposed to illness, death and other reminders of health fragility.

According to the Terror Management Theory (TMT; Greenberg et al., 1986) situations or experiences that remind an individual of their own mortality (mortality salience) can elicit death anxiety. TMT proposes that cultural worldviews and self-esteem function as psychological buffers against death anxiety (Pyszczynski et al., 1999). Cultural worldviews (e.g. religious/political beliefs, professional values, family and societal norms) allow individuals to increase self-esteem by adopting socially valued roles and living in accordance with cultural values and norms. This provides a sense of literal (e.g. beliefs about afterlife, immortal soul) and/or symbolic (e.g. legacy, cultural or societal achievements) immortality, which can protect against death anxiety (Greenberg et al., 1997). However, working in high-pressure environments and exposure to stressors over a prolonged period may disrupt these buffers; for example, a study of 418 nurses working across hospital departments found nurses with higher levels of burnout associated to work exhibited disruptive anxiety buffering responses such as self-esteem (Trifiletti et al., 2017). In a study of 163 nurses, Rababa et al. (2022) found death anxiety levels to be high among nurses working with older adults during the Covid-19 pandemic compared to medical/surgical nurses. Therefore, understanding how death anxiety may contribute to HA among HCPs working in environments where mortality salience is high, is of importance.

With the increasing concern of staff shortages across the UK, it is paramount to better understand the psychological wellbeing of staff. Although there is some research examining HA in HCPs, most studies have been conducted outside of UK and in the context of the Covid-19 pandemic (Chen et al., 2019; Saeedi et al., 2022). Additionally, to the best of the researcher's knowledge, no studies have compared physical and non-physical health settings. HCPs working in oncology and neurorehabilitation were recruited due to their clinical exposure to death, acute life-threatening injury and terminal illness, which may heighten mortality salience and may increase vulnerability to HA. In contrast, HCPs working in acute and/or Psychiatric Intensive Care Units (PICUs) were recruited as a comparison group based on their relevance as high-stress clinical environments (Currid, 2009) but typically less exposed to death and severe and life-threatening physical illness. This allowed for

comparisons across physical and mental health settings, offering insight into how HA may present in differing clinical environments. Additionally, to the researcher's knowledge, there are no recent studies exploring the possible underlying mechanisms of HA specifically within these groups, or which have sought to understand their experiences of working with life-threatening physical illness and in death-salient clinical environments.

3.2.5 The Present Study

The current study included HCPs working in inpatient oncology, neurorehabilitation and acute/PICU mental health setting. While HCPs groups working in settings such as spinal cord injury rehabilitation, emergency departments, intensive care units and older adults may also experience significant distress, they were excluded from taking part in this study to control for confounding variables. One key consideration is the ongoing exposure to chronic health conditions in neurorehabilitation and oncology settings, which involves prolonged patient contact, complex care needs and uncertainty. Although HCPs working in emergency departments and ICUs face high levels of unpredictability, these environments are also fast-paced and crisis oriented, which require quick decision-making and managing acute trauma. These experiences may lead to greater exposure to trauma, moral injury and burnout (Mealer et al., 2007; Aisling et al., 2016). Including these groups may have introduced additional psychological variables that are not central to the study's aim and may have also influenced the presentation of the psychological constructs being explored in this study.

Additionally, HCPs working in palliative and end of life care were excluded despite being routinely exposed to dying patients and death. This decision was made due to key aspects of their role being centered around death acceptance and symptom relief (Nacak & Erden, 2022) which differ from the clinical contexts of oncology and neurorehabilitation where treatment and recovery is often the focus. Additionally, HCPs working in palliative and end of life care may receive more support and training in existential care and may be more exposed to conversations about death and

dying. These experiences may reduce experiential avoidance and greater acceptance of mortality, reduce death anxiety and increase psychological flexibility. These exclusions helped to refine the study's scope and limit heterogeneity in clinical context.

Though there are some clinical similarities between spinal cord injury and neurorehabilitation settings, they were not included in the study due to time constraints and availability of established professional networks.

This mixed-methods study had three aims. First to examine the prevalence of HA across HCPs working in inpatient oncology and neurorehabilitation services compared to HCPs working in inpatient mental health services, specifically PICU and acute services. Second, to examine death anxiety, psychological flexibility and intolerance of uncertainty as psychological predictors of HA in HCPs, whilst accounting for potential confounding variables such as anxiety and depression symptoms, age, gender, clinical experience and clinical exposure to death, terminal illness and acute illness. Third, using a qualitative approach, to explore any self-reported lifestyle or behavioural changes because of their experiences of working with patients who are severely ill or dying.

The study's hypotheses are:

- HCPs working in oncology or neurorehabilitation services will report significantly higher levels of HA compared to HCPs working in PICU/acute mental health service
- HCPs working in oncology will report significantly higher scores than HCPs working in neurorehabilitation.
- Intolerance of uncertainty and death anxiety would be positively associated with HA and psychological flexibility would be negatively associated with HA.
- Intolerance of uncertainty, death anxiety and psychological flexibility would significantly predict HA.

Given the exploratory nature of the qualitative study, no pre-specified hypothesis was established.

3.3 Methods

3.3.1 Ethical Review

This study was approved by the University of Southampton Research Ethics Committee (ref. 91081.A1) (See Appendix B). NHS ethics approval was sought, and the study was reviewed by the NHS Research Ethics Committee, it was confirmed that no Health Research Authority approval was needed as the NHS was not acting as a Participant Identification Centre (See Appendix C).

3.3.2 Study Design and Participants

This was a cross-sectional mixed-methods study using an online, anonymous survey, administered to HCPs working in an inpatient hospital setting in oncology, neurorehabilitation and PICU and/or acute mental health service in England. The study followed a parallel-database mixed methods design (Creswell & Plano Clark, 2017) with quantitative and qualitative data collected simultaneously, analysed separately but then integrated together for interpretation. A qualitative component was included in order to explore behavioural intentions and lifestyle changes in response to the work setting as these may reflect ways HCPs manage HA that quantitative measures alone may not fully capture. While quantitative measures provide data on the presence and severity of HA, integrating qualitative responses aimed to contextualise how HA may translate into real-world behaviours and coping strategies, adding depth to the study (Wasti et al., 2022). The study adopted a critical realist approach which acknowledges that whilst knowledge exists, this is shaped by social, cultural and contextual factors and seeks to explore deeper structures and mechanisms, beyond what can be observed (Bhaskar, 2013; Zhang, 2022).

Data were collected from 9th May 2024 to 31st March 2025. Participants were able to participate in the study if they were over 18 years old, currently employed and working in a clinical role in one of the hospital settings (inpatient oncology, neurorehabilitation, acute/PICU mental health). Individuals were unable to participate if they had experienced HA prior to working in their role or had a diagnosis of a terminal physical health illness. A total of 200 individuals accessed the

survey. Out of the 200, 89 participants did not meet the inclusion criteria and therefore, were unable to complete the survey. In total, 111 HCPs met the inclusion criteria and completed the full survey. Demographic data for non-completers were not available. Demographic information is presented in Table 2.

Of the 111 professionals who completed the survey, 46 (41.4%) worked in a neurorehabilitation service, 36 (32.4%) in a mental health PICU or acute service and 29 (26.1%) in an oncology service. Professional roles were grouped in accordance with their clinical function, aligning with role categories reported in the National Health Service (NHS) Long Term Workforce Plan (NHS England, 2023).

Demographic comparisons were made with NHS workforce statistics (NHS Digital, 2025) as the sample was primarily NHS staff and to contextualise the study's sample. The majority of participants were White (82.9%; NHS: 66%), female (86.5%; NHS: 75.6%), in the age range of 25-34 (52.3%; NHS: 25.3%), non-religious (59.5%; NHS: 15.9%) and did not consider themselves as spiritual (64%). Most participants (81.1%) reported they had not experienced a significant loss or bereavement in the last 12 months due to illness. Years of experience varied widely, however, 2-4 years and 10+ years were the most reported.

Table 2

Sociodemographic characteristics of participants by group

Variable	n (%)			
	Neurorehabilitation (n = 46)	Oncology (n = 29)	Acute/PICU mental health (n = 36)	Total (N = 111)
Age				
18-24	3 (6.5)	1 (3.4)	4 (11.1)	8 (7.2)
25-34	21 (45.7)	13 (44.8)	24 (66.7)	58 (52.3)
35-44	8 (17.4)	8 (27.6)	2 (5.6)	18 (16.2)
45-54	8 (17.4)	6 (20.7)	5 (13.9)	19 (17.1)
55-65	6 (13)	0 (0.0)	1 (2.8)	7 (6.3)
65-74	0 (0.0)	1 (3.4)	0 (0.0)	1 (0.9)
Gender				
Female	42 (91.3)	25 (86.2)	29 (80.6)	96 (86.5)
Male	3 (6.5)	4 (13.8)	6 (16.7)	13 (11.7)
Non-binary	1 (2.2)	0 (0.0)	1 (2.8)	2 (1.8)
Ethnicity				
White	40 (87.0)	26 (89.7)	26 (72.2)	92 (82.9)
Asian (Indian, Pakistani, Bangladeshi, Chinese, any other Asian background)	4 (8.7)	1 (3.4)	6 (16.7)	11 (9.9)
Black/African/Caribbean	2 (4.3)	2 (6.9)	2 (5.6)	6 (5.4)

Mixed two or more ethnic groups	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Other (Arab or any others)	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Sector				
NHS	45 (97.8)	29 (100.0)	33 (91.7)	107 (96.4)
Private	0 (0.0)	0 (0.0)	3 (8.3)	3 (2.7)
Charity	1 (2.2)	0 (0.0)	0 (0.0)	1 (0.9)
Role				
Psychological Professions	13 (28.3)	5 (17.2)	16 (44.4)	34 (30.6)
Allied Health Professionals	22 (47.8)	6 (20.7)	1 (2.8)	29 (26.1)
Nursing	5 (10.9)	10 (34.5)	7 (19.4)	22 (19.8)
Additional Clinical Services	2 (4.3)	3 (10.3)	4 (11.1)	9 (8.1)
Medical	3 (6.5)	1 (3.4)	5 (13.9)	9 (8.1)
Advanced Clinical Practitioners including trainees	1 (2.2)	1 (3.4)	0 (0.0)	2 (1.8)
Research Delivery	0 (0.0)	2 (6.9)	0 (0.0)	2 (1.8)
Administrative and Clerical	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Management	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Pharmacy Services	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Social Care / Social Work	0 (0.0)	1 (3.4)	0 (0.0)	1 (0.9)
Years of Clinical Experience				
0-6 months	6 (13.0)	3 (10.3)	9 (25.0)	18 (16.2)
6 months – 1 year	4 (8.7)	3 (10.3)	2 (5.6)	9 (8.1)
1 -2 years	3 (6.5)	4 (13.8)	7 (19.4)	14 (12.6)

2-4 years	7 (15.2)	5 (17.2)	12 (33.3)	24 (21.6)
4-6 years	3 (6.5)	2 (6.9)	2 (5.6)	7 (6.3)
6-8 years	3 (6.5)	4 (13.8)	1 (2.8)	8 (7.2)
8-10 years	4 (8.7)	2 (6.9)	1 (2.8)	7 (6.3)
10+ years	16 (34.8)	6 (20.7)	2 (5.6)	24 (21.6)
Religion				
No Religion	27 (58.7)	18 (62.1)	21 (58.3)	66 (59.5)
Christian (including Church of England, Catholic, Protestant and all Other Christian denominations)	16 (34.8)	9 (31.0)	9 (25.0)	34 (30.6)
Muslim	1 (2.2)	1 (3.4)	4 (11.1)	6 (5.4)
Hindu	1 (2.2)	0 (0.0)	1 (2.8)	2 (1.8)
Other	1 (2.2)	1 (3.4)	0 (0.0)	2 (1.8)
Buddhist	0 (0.0)	0 (0.0)	1 (2.8)	1 (0.9)
Consider themselves as a spiritual person				
No	29 (63.0)	16 (55.2)	26 (72.2)	71 (64)
Yes	16 (34.8)	13 (44.8)	10 (27.8)	39 (35.1)
Prefer not to say	1 (2.2)	0 (0.0)	0 (0.0)	1 (0.9)
Experience a significant loss/bereavement in the past 12 months due to illness				
No	39 (84.8)	24 (82.8)	27 (75.0)	90 (81.1)
Yes	7 (15.2)	5 (17.2)	9 (25)	21 (18.9)

3.3.3 Patient and Public Involvement

Feedback was obtained from PPI contributors on the study design and survey. Purposive sampling was used to select a diverse group. Six HCPs expressed interest to take part, however only four attended the one-off feedback session, which lasted one hour. At least one contributor for each service (oncology, neurorehabilitation and PICU/acute) attended. Contributors provided feedback on the study's aims, recruitment strategy and survey. They expressed that the aims were meaningful and clinically relevant. The length of the survey was deemed appropriate and the measures included were viewed as relevant. The qualitative questions were revised, following feedback from collaborators to add examples of lifestyle and behavioural changes for clarity. Their feedback also led to reviewing the wording of demographic questions and adjusting the order of the survey to alternate between types of questions (e.g. free-text, multiple choice) to reduce survey fatigue.

The qualitative free-text item about behaviour intention was positioned in the middle of the survey to interrupt the sequence of structured and multiple-choice quantitative measures, ensuring valuable qualitative data was gathered before possible fatigue and reduced motivation could occur. Additionally, PPI contributors emphasised the importance of the death anxiety scale to be placed before the qualitative question given the sensitive nature of the topic. This allowed participants to complete it at a point where they are not so fatigued, reducing the risk of them becoming overwhelmed. The subsequent qualitative question was considered to provide a reflective break that may help distract from the heaviness of the questionnaire. The second qualitative question was included at the end of the survey to offer an opportunity for participants to offer any additional thoughts that they felt were important and not captured in the survey.

Contributors gave valuable suggestions to increase recruitment of minority and underrepresented groups through various group forums, trade unions and professional networks, which was incorporated in the recruitment process.

3.3.4 Procedure

The researchers primarily targeted HCPs working in the NHS via NHS Trust Research and Development teams across England (See Appendix D). Equality, diversity and inclusion group networks in NHS Trusts were contacted for engagement and recruitment of underrepresented groups. Additionally, charities, independent sectors, trade unions were also approached but with less emphasis. The study was advertised through already established e-mail distribution lists, employee intranet pages, Trust's social media, news bulletins and posters (See Appendix E) displayed in staff areas. The researchers also advertised the study on personal social media pages and LinkedIn (See Appendix F).

Staff completed an online survey on Qualtrics which contained the participant information sheet, consent form and at the end of the survey a debrief form (See Appendix G). The mean completion time was 30.1 minutes (*SD* = 115.9); however, this figure likely overestimates active survey engagement as it includes periods of inactivity. Prior to completing the survey, participants were asked four questions to ensure they were eligible to participate; (1) they currently work in an inpatient oncology, neurorehabilitation, acute or PICU mental health setting, (2) they work in a clinical setting in the NHS, charity or private sector (3) do not have a current diagnosis of a terminal or life-limiting physical health illness and (4) did not receive a diagnosis of HA prior to working in their current job. Participants were given a choice to enter a prize draw to win 1 of 3 £25 vouchers by clicking a separate link (See Appendix H) to the study's survey to reimburse them for their time.

3.3.5 Measures

Demographic information. Participants' demographic information was collected for sample characteristics and to assess for potential confounding variables. This included type of service, role and years of experience, ethnicity, age, gender, religion, spirituality, any significant bereavements

related to illness in the last 12 months and clinical exposure to death, acute life-threatening medical emergencies, terminal or life-limiting illness.

HA symptoms. Symptoms of HA were measured using the short health anxiety inventory, 18 items (SHAI-18; Salkovskis et al., 2002). The SHAI consists of 18 items, each item is grouped in four statements and respondents are asked to select the statement which best describes how they have felt. Scores of 18 or higher indicate HA as per the DSM-V criteria (Rode et al., 2006). The SHAI-18 is widely used and has demonstrated good psychometric properties in both non-clinical (Abramowitz, Deacon & Valentiner, 2007) and clinical samples (Salkovskis et al., 2002). This scale demonstrated good internal consistency (α = .89).

Depression and anxiety symptoms. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) was used to measure levels of general anxiety and depression. The HADS is a 14-item scale, with a four-point Likert scale and higher scores indicate more severe anxiety and/or depression. The HADS has shown high reliability and good to very good concurrent validity across clinical and general population (Bjelland et al., 2002). This scale demonstrated good internal consistency (α = .89).

Intolerance of uncertainty. Carleton et al.'s (2007) intolerance of uncertainty scale, 12 item (IUS-12) measures reactions to situations that are ambiguous, uncertainty and the future. It is a 12-item scale rated on a 5-point scale, with two subscales: prospective and inhibitory anxiety. Higher scores indicate higher levels of intolerance of uncertainty. The IUS-12 has proven to have good internal reliability, moderate-high concurrent validity and considered to be particularly useful when participants are completing a battery of questionnaires (Khawaja & Yu, 2010). This scale demonstrated excellent internal consistency (α = .90).

Psychological flexibility. The Psy-Flex (Gloster et al., 2021) was used to measure the six components of psychological flexibility according to the theoretical model of Acceptance and Commitment therapy. It consists of 6-items, each rated on a 5-point Likert scale, with higher scores

reflecting greater psychological flexibility. It has shown excellent reliability as well as good convergent and incremental validity across a range of samples (Gloster et al., 2021). This scale demonstrated good internal consistency (α = .84).

Death anxiety. Templer Death Anxiety Scale (DAS; 1970), a widely used measure of death anxiety was used (Cai et al., 2017). The DAS is a 15-item scale, with a dichotomous scale of true or false. The DAS is one of the measures of death anxiety with most evidence supporting its validity and reliability (Zuccala et al., 2022). Items 2, 3, 5, 6, 7 and 15 were reverse-coded. This scale demonstrated questionable internal consistency (α = .63).

Behavioural intention. Participants were asked to provide qualitative feedback based on the following questions: (1) due to working in this setting, have you made lifestyle changes (i.e. eating and drinking, physical safety, exercising, stress management, health monitoring, social) that you did not do before and (2) is there anything else that you feel is important about your experience in working in this setting?.

3.3.6 Statistical Analysis

An *a priori* power analysis was conducted using G*Power 3.1 (Faul et al., 2009) and indicated a required sample size of 135 for a multiple hierarchical regression with 9 predictors to detect a moderate effect size.

Quantitative analysis. Data was exported from Qualtrics (2024) to SPSS Statistics (version 28.1.1.0) for data analysis. Frequencies and percentages were used to describe participant characteristics in this study. Responses related to exposure to death, life-threatening medical emergency and terminal or life-limiting illness were grouped into ‘low (never/rarely), ‘moderate’

(sometimes) and 'high' (often/always) exposure. Additionally, means and standard deviations were calculated for all continuous variables.

As participants had to provide complete responses to complete the survey, there were no missing data. Demographic data for non-completers were not available. All continuous variables were assessed for normality through visual inspections of histograms, Q-Q plots, box plots and Shapiro-Wilks tests. Visual inspections of histogram and boxplot indicated the distribution of SHAI scores were fairly symmetrical, though with a slight skew to the right, and two mild outliers were identified but not excluded. The Shapiro-Wilk test of normality indicated data was normally distributed (W = .979, p = .074) and skewness (.413) and kurtois (.330) were in the acceptable range. Overall, the findings suggest that SHAI scores were approximately normally distributed and parametric analysis were deemed suitable. All other continuous variables met the assumptions necessary for parametric analyses. Although, a small number of outliers were identified on univariate variables (Psy-Flex, DAS), they were minimal and did not violate assumptions and were therefore retained.

Potential confounding variables were identified based on existing research and included anxiety and depression (measured by the HADS), ethnicity, years of clinical experience, age, gender, religion, spirituality, religion and clinical exposure to death, acute life-threatening medical emergency and terminal and/or life-limiting illness. Bivariate analyses found only exposure to terminal and/or life-limiting illness was significantly associated with both staff group and HA and therefore was included in the regression model at step 1.

To explore differences between staff group and HA scores, a one-way analysis of variance (ANOVA) was performed and Levene's test for homogeneity of variances was used. Independent samples t-tests and one-way ANOVAs were conducted to explore associations between sociodemographic and work-related exposure and HA. Chi-square tests of independence were used to assess the relationship between categorical demographic information and staff group. Only

variables that showed a significant association were included in subsequent analysis as covariates to preserve statistical power and reduce the risk of overfitting (Field, 2024). Pearson's correlations were conducted between all continuous variables.

Hierarchical multiple regression analysis was conducted to examine how psychological variables predict HA anxiety scores. Exposure to illness was entered as a confounder at step one, staff group at step two and the three psychological predictor variables were included at step three. The following categorical variables were dummy coded; staff group (neurorehabilitation = reference group) and exposure to terminal and/or life-limited illness (high exposure = reference group). Variance inflation factors (VIF) and tolerance values were inspected for multicollinearity and inspection of residual and scatterplots for normality, linearity and homoscedasticity. Adjusted R^2 and Cohen's f^2 effect sizes are reported.

P values of <.05 were considered significant and all tests were two-tailed.

Qualitative analysis. Free-text responses were analysed by the main researcher (JF) using Excel. An inductive approach was used and Braun and Clarke (2006, 2021) reflexive thematic approach was taken to explore HCPs self-reported lifestyle or behavioural changes resulting from their work experiences. This approach was chosen to identify, analyse and interpret patterns of meaning across the data given the exploratory nature of the study. Although content analysis has developed to include qualitative elements such as reflexivity (Nicmanis, 2024), it remains grounded in quantitative research. Its aim is to provide a conceptual description of the data by categorising based on frequency (Vaismoradi et al., 2013). Therefore, reflexive thematic analysis was considered more appropriate for capturing the depth and complexity of the data instead of focusing on surface-level content or meaning.

In line with Braun and Clarke (2006, 2021) reflexive thematic analysis, the following steps were taken; (1) initial familiarisation with the data involved reading over responses several times which initial notes were made using pen and paper, (2) preliminary descriptive codes were assigned

in relation to the research question, (3) codes were reviewed and patterns that developed were generated into initial overarching themes, (4) themes were reviewed and refined, some themes were merged for clearer interpretation and conciseness, (5) finally, themes were defined and named.

A reflective journal was kept throughout data collection and analysis by the main researcher to document personal reactions and thoughts, interpretations of the data, practical issues and rationale for decisions made. Supervision with WD and AM provided opportunities to discuss codes, preliminary themes and reflections throughout the duration of the study.

3.4 Results

3.4.1 HA across Staff Groups

The proportion of participants scoring above SHAI cut-off (≥18) across the three groups were 36.9%. This was highest among HCPs working in oncology (44.8%), followed by neurorehabilitation (34.8%), and then acute/PICU mental health (33.3%). Descriptive statistics for HA and other psychological measures are presented in Table 3. ANOVA was conducted to examine the effect of staff group (oncology, neurorehabilitation and PICU/acute) on HA. A Levene's test confirmed the assumption of homogeneity of variance was met *(p* = .954). The results did not indicate a significant difference in HA scores among staff groups, $F(2,108) = 1.98$, $p = .143$, $\eta^2 = .035$. Staff group had a small, non-significant effect on HA scores.

Table 3

Means and standard deviations of continuous measures by staff group

Variable	Oncology (n = 29)		Neurorehabilitation (n = 46)		PICU/Acute (n = 36)		Total Sample (N =111)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SHAI	17.10	6.98	14.5	7.01	13.83	6.71	14.96	6.97
HADS	12.97	6.29	11.83	7.64	11.28	6.62	11.95	6.95
DAS	7.76	1.84	6.17	2.71	6.78	2.97	6.78	2.66
IUS-12	31.72	6.77	31.65	10.15	33.86	10.66	32.39	9.54
Psy-Flex	22.45	4.26	22.93	4.09	22.89	4.0	22.79	4.07

Note. SHAI = short health anxiety inventory; HADS = hospital anxiety and depression scale; DAS = Templer death anxiety scale; IUS-12= intolerance of uncertainty scale-12 item

3.4.2 Group Differences in Demographic and Psychological Variables

Chi-square tests of independence revealed no significant association ($p > .05$) between staff group and years of experience, bereavement, ethnicity, age, gender, religion and spirituality. All types of exposure revealed a significant association between staff group; death exposure, X^2 (4, N = 111) = 57.20, $p < .001$, acute medical emergency, X^2 (4, N = 111) = 22.46, $p < .001$ and terminal and/or life-limiting illness, X^2 (4, N = 111) = 53.39, $p = < .001$. As presented in Table 4, HCPs working in oncology, reported the highest exposure to terminal and/or life-limiting illness and death. Higher exposure levels to acute life-threatening medical emergencies were reported by HCPs working in neurorehabilitation services.

One-way ANOVAS revealed a significant effect of staff group on death anxiety ($F(2,108) = 3.29$, $p = .041$, $\eta^2 = .057$). Tukey's HSD Test found significant difference in DAS scores between HCPs working in oncology and those in neurorehabilitation ($p = .03$) but not acute/PICU ($p = .291$) setting. HCPs working in oncology ($M = 7.76$, $SD = 1.84$) reported higher death anxiety scores compared to

HCPs working in neurorehabilitation (*M* = 6.17, *SD* = 2.71) and acute/PICU (*M* = 6.78, *SD* = 2.97). However, no significant difference effect of staff group on intolerance of uncertainty, anxiety and depression and psychological flexibility was found.

Table 4

Exposure to death, acute life-threatening medical emergencies and terminal or life-limiting illnesses by staff group (N = 111)

Service	n (%)								
	Death			Acute life-threatening medical emergencies			Terminal/life-limiting illnesses		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Neurorehabilitation	23 (50.0)	19 (41.3)	4 (8.7)	8 (17.4)	11 (23.9)	27 (58.7)	10 (21.7)	16 (34.8)	20 (43.5)
Oncology	3 (10.3)	6 (20.7)	20 (69.0)	10 (34.5)	10 (34.5)	9 (31.0)	0 (0.0)	1 (3.4)	28 (96.6)
Acute/PICU	28 (77.8)	7 (19.4)	1 (2.8)	20 (55.6)	12 (33.3)	4 (11.1)	21 (58.3)	11 (30.6)	4 (11.1)
Total	54 (48.6)	32 (28.8)	25 (22.5)	38 (34.2)	33 (29.7)	40 (36.0)	31 (27.9)	28 (25.2)	52 (46.8)

3.4.3 Group Differences in HA and Demographic Variables

ANOVAs and independent samples t-test were conducted to explore which demographic variables were associated with HA. No significant effect (p >.05) of years of experience, bereavement, age, gender, religion, spirituality and clinical exposure to death or acute life-threatening medical emergencies and HA symptoms measured by the SHAI. One-way ANOVA revealed that there was a significant difference in ethnicity between at least two groups ($F(4,106) = 3.54$, $p = .009$, $\eta^2 = .118$). Due to two groups having only one participant, these were removed to meet the assumptions required for Tukey's HSD and the Tukey's HSD was conducted among the remaining three groups. Tukey's HSD Test found a significant difference in SHAI scores between participants identifying as White and those identifying as Black, African or Caribbean ($p = .03$). White participants ($M = 15.77$, $SD = 6.79$) reported higher HA scores compared to participants who identify as Black, African or Caribbean ($M = 8.33$, $SD = 3.73$). No significant differences were found between White and Asian ($M = 14.0$, $SD = 6.65$) participants ($p = .683$), and Black, African or Caribbean and Asian participants ($p = .220$). Further, a significant difference was found for the level of clinical exposure to individuals with a terminal or life-limiting illness ($F(2,108) = 8.09$, $p = < .001$, $\eta^2 = .130$). Tukey's HSD post hoc test revealed that participants who reported 'high' exposure had higher SHAI scores ($M = 17.40$, $SD = 7.12$) compared to participants who reported moderate exposure ($M = 11.36$, $SD = 5.54$) to individuals with a terminal or life-limiting illness. No significant differences were reported between low ($M = 14.13$, $SD = 6.40$) and moderate exposure ($p = .241$) and low and high ($p = .075$).

3.4.4 Associations between Psychological Processes and HA

Pearson's correlation coefficient was performed to examine bivariate associations of continuous variables and are presented in Table 5. HA was significantly positively correlated with anxiety and depression ($r = .49$, $p < .001$), death anxiety ($r = .60$, $p < .001$), intolerance of uncertainty

(r = .40, p < .001) and significantly negatively associated with psychological flexibility (r = -.44, p < .001).

Table 5

Pearson correlations between psychological construct and process and HA

	1	2	3	4	5
1. SHAI	1				
2. HADS	.486*	1			
3. DAS	.596*	.364*	1		
4. IUS-12	.403*	.510*	.421*	1	
5. Psy-Flex	-.442*	-.662*	-.376*	-.502*	1

Note. SHAI = short health anxiety inventory; HADS = hospital anxiety and depression scale; DAS = Templer death anxiety scale; IUS-12= intolerance of uncertainty scale-12 item

* Correlation is significant at the 0.01 level (1-tailed).

3.4.5 Exploring Predictors of HA using Hierarchical Multiple Regression

A three-step hierarchical multiple regression was conducted, using forced entry method. In step one of the regression analyses exposure levels to individuals with terminal or life-limiting illnesses (high [reference], moderate, low) was entered to control for its potential influence on HA. Staff group (neurorehabilitation [reference], oncology, acute/PICU) was entered at step two and death anxiety, intolerance of uncertainty and psychological flexibility at step three.

The analyses revealed that at step one, exposure to individuals with a terminal or life-limiting illness explained 13% of the variance in HA scores (R^2 = .130, Adjusted R^2 = .114), which was significant (p < .001). At step-two, staff group accounted for a very small proportion of variance of 0.1% (R^2 = .131, Adjusted R^2 = .098), which was non-significant (p = .968). The final model which included psychological predictors explained an additional 31.8% of the variance in HA (R^2 = .449, Adjusted R^2 = .412) and was statistically significant (p < .001). The overall model predicted 44.9% of

variance in HA and was significant, $F(7,103) = 11.998$, $p < .001$ with a very large effect size (Cohen's $f^2 = 0.58$) (Cohen, 1988). In the final regression model, death anxiety ($B = 1.116$, $\beta = .426$, $p < .001$) and psychological flexibility ($B = -.352$, $\beta = -.206$, $p = .021$) emerged as significant predictors of HA. Death anxiety was the strongest predictor and uniquely accounted for 12.57% of the variance in HA, while psychological flexibility explained 2.93%. Table 6 displays the full results of the regression.

Collinearity statistics showed that multicollinearity was not a concern for any of the predictors. The range for tolerance values was between .49 and .87 and VIF values ranged from 1.150 to 2.045, with an average of 1.56 (*SD* = .26) which are within the acceptable range (Field, 2024). There was no evidence of auto correlation in the residuals as indicated by Durbin-Watson statistic of 2.1.

Table 6

Hierarchical multiple regression predicting HA (SHAI-18) symptoms

Model	Variable	B	SE	*β*	*t*	Semi-partial R^2 (%)
1	(Constant)	8.082	1.936		4.175**	
	TI Low Ex	3.275	1.488	.212	2.201*	3.9
	TI Exp Moderate	6.047	1.537	.379	3.935**	12.47
2	(Constant)	7.900	3.338		2.367*	
	TI Low Ex	3.566	1.957	.231	1.823	2.72
	TI Exp Moderate	6.227	1.826	.390	3.411**	9.54
	Oncology	.123	1.800	.008	.068	.01
	Acute/PICU	-.375	1.620	-.025	-.232	.04
3	(Constant)	8.339	5.541		1.505	
	TI Low Ex	1.998	1.616	.129	1.236	.82
	TI Exp Moderate	2.687	1.549	.168	1.735	1.61
	Oncology	.618	1.474	.039	.419	.09
	Acute/PICU	.913	1.337	.062	.683	.25
	DAS	1.116	.230	.426	4.848**	12.57
	IUS-12	.079	.066	.108	1.192	.76
	Psy-Flex	-.352	.150	-.206	-2.341*	2.93

a. Dependent variable: SHAI (short health anxiety inventory-18)

Note. TI Low Ex = low exposure to individuals with terminal illness or life-limiting illness; TI Exp Moderate = moderate exposure to individuals with terminal or life-limiting illness; DAS = Templer death anxiety scale; IUS-12= intolerance of uncertainty scale-12 item

*$p < .05$, ** $p < .001$

3.4.6 Exploratory Moderator Analysis

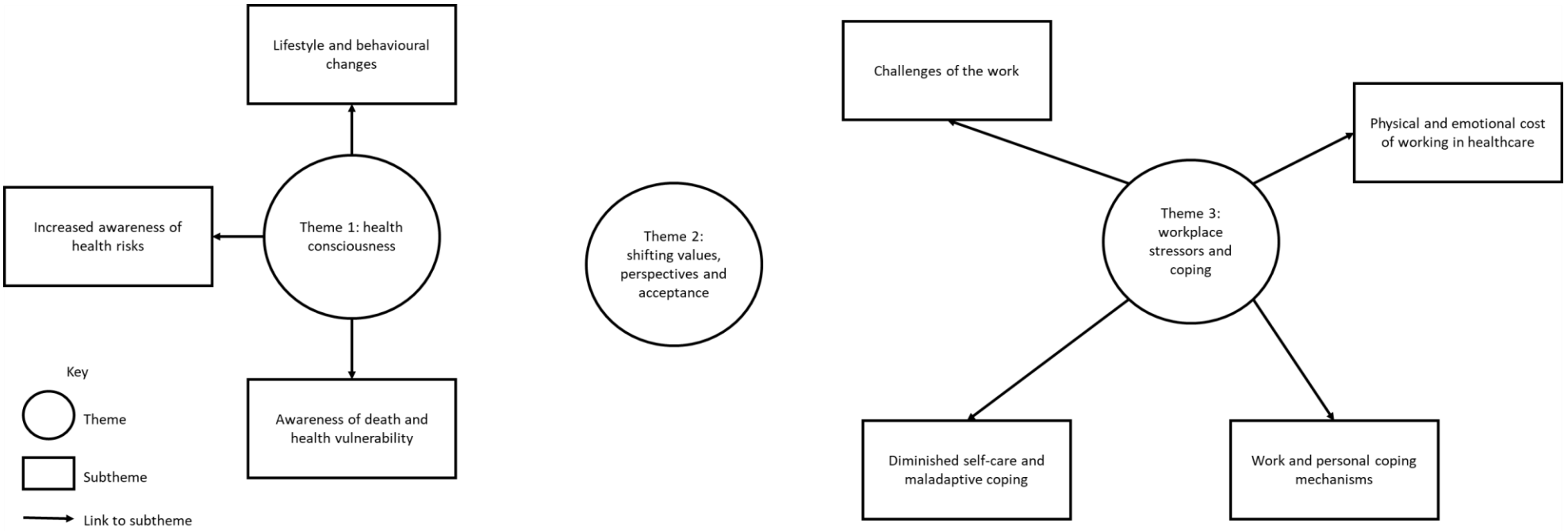
An exploratory moderation analysis was carried out using PROCESS v4.2, model 1 (Hayes, 2022) to test whether psychological flexibility moderated the relationship between death anxiety and HA. Although, the overall model was significant (R^2 = .41, ; $F(3, 107) = 24.92$, $p < .001$), the interaction term was non-significant (B = –0.006, SE = 0.048, p = .904, $\Delta R^2 < .001$), indicating that psychological flexibility did not moderate the relationship between death anxiety and HA.

3.4.7 Thematic Analysis

A reflexive thematic analysis was conducted on free text responses regarding lifestyle changes and any additional reflections about participants' experiences related to their work. Approximately, 28.8% of participants (33.3% acute/PICU, 26.1% neurorehabilitation, 27.6% oncology proportionally) reported they had not made any lifestyle changes because of their work. In contrast, over 71% of participants did report lifestyle changes. Data analysis yielded three themes, with seven subthemes, presented in Figure 4. The thematic map depicts the interconnectedness and meaningful overlap between some of the developed themes. HCPs reflections on becoming more health conscious for example, having an increased awareness of death and health vulnerability prompted deeper reflections about health and life's unpredictability. The awareness of life's fragility and death was also spoken about in terms of shifting personal values of what is important and becoming more accepting of uncertainty. Additionally, theme 3 illustrated the interplay between the challenges faced at work by HCPs, leading to increased emotional and physical strain, and in turn resulting in a deprioritisation of self-care and increase in unhelpful coping strategies.

Figure 4

Thematic map of themes and subthemes



Theme 1: Health consciousness. This theme captures how participants work environments and exposure to health issues have contributed to their awareness, concerns and behaviours related to their health and wellbeing. Three subthemes were identified: (1) lifestyle and behaviour changes; (2) increased awareness of health risks; and (3) awareness of death and health vulnerability. As this theme has close cognitive and behavioural links to HA, theme frequencies are reported as percentages in proportion to participants within each staff group. Frequencies are used to demonstrate variations across the staff groups but do not imply generalisability or determine the importance of subthemes.

Lifestyle and behaviour changes. This subtheme encapsulates lifestyle and behaviour changes that reflect actions taken by individuals to prevent or detect illness and enhance wellbeing. Although, these experiences were reported by all groups they were more common amongst HCPs working in oncology (48.3%) and neurorehabilitation (52.2%) than acute/PICU (27.8%) services.

Participants reflected on the impact of their current roles in influencing them to take a more proactive approach to their personal health. Participants reported a range of primary prevention behaviours such as “stopping smoking” (acute/PICU, discharge coordinator), “more diligent with applying sun cream and avoiding midday sun” (oncology, clinical psychologist) and reducing alcohol intake. An increase in health-promoting behaviours (e.g. exercising and eating healthily) were also reported by many participants. One participant reported, “exercise more, more regular self-checks (i.e. breasts), reducing alcohol” (oncology, speech and language therapist). Another shared, “i work in stroke - i have been mindful of things such as artificial sweeteners, smoking, alcohol use and taking the contraceptive pill since i have been more exposed to younger people having strokes” (neurorehabilitation, trainee clinical psychologist).

Increased awareness of risks to health and physical injury. This subtheme describes how participant's professional roles increased their knowledge and awareness of health and injury risks. This subtheme was more frequently mentioned by HCPs working in neurorehabilitation (15.2%), than other settings. Exposure to illness or sudden injury at work was reported to lead to increased awareness and hypervigilance of risk. One participant reflected, "I'm more conscious a lot of the time about sustaining a TBI after hearing the situations that bring my patients in. E.g. car accident, falling when drunk." (neurorehabilitation, clinical psychologist). Participants shared an increased awareness of health risks and physical injury, which extended beyond the workplace and into their personal lives, for example one participant shared, "I'm more nervous about cycling and the risks of accidents/head injuries" (neurorehabilitation, physiotherapist).

This for some elicited fear of "something catastrophic happening… (e.g. brain injury- stroke-TBI)" (neurorehabilitation, highly specialist physiotherapist) to themselves or loved ones. Some participants reflected that risk and injury-related hypervigilance extended to family members, with one participant explaining, "I avoid letting my young daughter play on trampolines with other children due to the risk of injury." (neurorehabilitation, clinical psychologist). The changes in behaviour and lifestyle adopted by participants demonstrate how clinical exposure to patients who have experienced an acute life-threatening event appear to shape how they appraise daily events through a lens of risk and vigilance.

Awareness of death and health vulnerability. This subtheme describes participants increased awareness of death and health fragility. Participants working in oncology (13.8%) and neurorehabilitation (15.2%) reported how regular exposure to dying patients and critically unwell patients prompted reflection on the unpredictability of life and "how short life can be, or how serious accidents can happen to anyone" (neurorehabilitation, assistant psychologist). Another participant echoed this, saying, "due to working with very unwell cancer patients full time and seeing their struggle and pain I feel we are all just waiting to get a cancer diagnosis" (oncology, acute oncology clinical nurse specialist).

One participant (oncology, social worker) shared thinking about death frequently since working with cancer patients who had young children, which triggered thoughts about their own death and the impact this would have on their own children. This participant reflected that developing a personal understanding of death providing some relief, "…have become more interested in Buddhist teachings that have helped me to feel less worried about dying. I am not religious but I have needed to create my own understanding of what will happen when I ide [sic].".

One participant described how moving from a physical health to mental health setting reduced worry about health, "I worry less about health conditions while working on a mental health unit compared to when I was working in a physical health setting (neuro rehab)" (acute/PICU mental health, trainee clinical psychologist). The shift in perception about illness highlights how clinical context, such as exposure to physical health environments may increase awareness of health fragility and death.

Theme 2: Shifting Values, Perspectives and Acceptance. HCPs reflected how their professional experiences have contributed to developing a different perspective on life. Some participants described having a broader outlook on life, being more present and reevaluating personal values. One participant shared "It opens your eyes to what is important and what is not relevant in life. I love my job and it has given me a different perspective on life." (oncology, sister). Additionally, some reported becoming more "thankful" and experiencing strong feelings of gratitude for life and health. One participant reflected, "working with people following traumatic events - makes you consider what you are able to do currently and enjoy it as much as we can" (neurorehabilitation, occupational therapist).

Participants reflected on acknowledging reality and accepting uncertainty and life's unpredictability. One participant shared, "I think general acceptance that nothing can ever be promised…" (neurorehabilitation, assistant psychologist). Participants described learning to "let go of things", and one participant described "letting things that I cannot control flow and trying focus on what I can control" (acute/PICU mental health, core trainee in Psychiatry).

Theme 3: Workplace stressors and coping. Broadly, this theme represents the various pressures and challenges faced by HCPs in their workplace environment contributing to a toll on their physical and mental health. It highlights systemic and individual coping strategies supporting wellbeing. This theme encapsulates four subthemes: (1) *challenges of the work*, (2) *physical and emotional cost of working in healthcare*, (3) *diminished self-care and maladaptive coping* and (4) *work and personal coping mechanisms*.

Challenges of the work. Across all three services, participants reported experiencing stressful and demanding environments. Some participants reported this could be fuelled by the unpredictability and uncertainty of the work, lack of staff resources and pressure to meet unclear demands. One participant shared, “the pressure to meet certain demands can be tricky, especially with lack of understanding from other professionals on remit of the role.” (oncology, senior occupational therapist). Additionally, another participant shared, “staff witnessing distressing incidents (e.g. self-harm) or being involved in restraint of patients” (acute/PICU mental health, clinical psychologist) as a challenge of the work.

Some participants shared feeling a lack of “formal” support, with one participant describing an “expectation to 'carry on as normal' immediately in my working role after a patient has just died or I have performed 'care after death'/'last offices'” (oncology, healthcare support worker). Another participant reported “we are expected to deal with quite extreme situations and just process them by ourselves with no help.” (oncology, consultant oncologist).

Physical and emotional cost of working in healthcare. Participants identified the emotional strain of working in healthcare which often lingered outside of the work environment into their personal lives. Exposure to highly emotive and distressing events contributed to heightened experiences of emotions such as panic, with one participant sharing “I had an episode of panic over a period of a few months brought on by witnessing traumatic events at work” (oncology, senior staff nurse). Some participants reported self-doubt about whether they were doing enough to help patients. One participant shared “feelings of guilt for not being able to help enough. Work & patients often consume my mind when outside of work.” (neurorehabilitation, lead physiotherapist).

Physical depletion due to the demands of the job was also reported. Participants shared feeling “stressed”, “burnout” and “exhausted”. One participant described, “the amount of stress can manifest as tension in the body or exhaustion and have a knock on affect on how active I am outside my life.” – (acute/PICU mental health, CBT therapist).

Diminished self-care and maladaptive coping. Several participants noticed a reduction in self-care practices and increased maladaptive and avoidant strategies to manage workplace demands and emotions. One participant shared, “I feel I am more hungry in this role and I struggle to control my eating sometimes, sometimes I feel I need an alcoholic drink after shifts which is new to me.” – (acute/PICU mental health, clinical support worker). Work factors such as long working hours, work-related stress, lack of time and tiredness were also shared by HCPs as barriers to self-care and wellbeing. One participant reported, “stress eating more, less able to exercise due to lack of energy and stress, less social than before” – (oncology, nurse).

Work and personal coping mechanisms. Individual and systemic support strategies were discussed by participants as efforts to cope with the physical and emotional demands of their roles. Individual coping encompassed a range of strategies such as mindfulness, spending time with loved ones and starting new hobbies to help promote work-life balance. Though these were mostly reported by HCPs working in neurorehabilitation and oncology settings. One participant shared, “Well-being and mindfulness changes - Taking up new hobbies to take my mind off my working day. I have started crafting like knitting and art.” (oncology, support worker). Another participant reported, “exercising more often during the week, managing stress by doing activities I enjoy” – (neurorehabilitation, specialist physiotherapist in stroke and general rehab).

Participants highlighted the protective role of having a supportive team in managing stress and difficulties at work. One participant reflected, “important to look after colleagues (watch for emotional and physical burnout), and for them with you- a supportive, caring team is paramount” (neurorehabilitation, clinical specialist physiotherapist). Additionally positive organisational processes were considered as an importance source of support, as reported by one participant,

"Having regular supervision with a manager who is flexible and empathetic is essential. It has helped me to enjoy my job and become more self-aware" (oncology, speech and language therapist).

3.5 Discussion

This mixed methods study examined the association between HA and staff groups working across oncology, neurorehabilitation and PICU/acute mental health inpatient settings. It also explored psychological flexibility, intolerance of uncertainty and death anxiety as possible predictors of HA in HCPs. Quantitative findings revealed no significant differences in HA levels between staff groups. Specifically, HCPs in oncology and neurorehabilitation did not report higher HA symptoms than HCPs working in a mental health setting, nor did oncology staff show higher HA than neurorehabilitation staff. Therefore, these findings did not support the study's hypotheses. In line with the study's hypotheses, intolerance of uncertainty and death anxiety were positively associated with HA, while psychological flexibility was negatively associated. Additionally, regression analyses found that death anxiety and psychological flexibility significantly predicted HA, whereas intolerance of uncertainty did not, therefore providing partial support for the hypotheses. Reflexive thematic analysis generated three overarching themes: (1) health consciousness, (2) shifting values, perspectives, and (3) acceptance, and workplace stressors and coping. These themes capture HCPs increased awareness and lifestyle changes regarding their own health, evolving priorities and challenges faced in their roles, and strategies used to manage wellbeing.

3.5.1 Differences in Health Anxiety Across Clinical Groups

The prevalence of HA across all groups was high (36.9%), consistent with Chen et al. (2019) findings who reported a high prevalence of HA (30.14%) in a sample of 1702 medical employees and substantially higher compared to HA in the general population (0.04%-4.5%) (Weck et al., 2014). This may reflect shared occupational stressors faced by HCPs across settings including high workloads, emotional demands and a lack of support which may trigger psychological distress (Ballout, 2025; Lyu et al., 2024; Sharma-Virk et al., 2025). The elevated prevalence of HA in HCPs may be explained by the overlap in mechanisms (e.g. excessive worry, misinterpretation of bodily sensations) between HA and other anxiety disorders such as generalised anxiety and panic disorder (Abramowitz, Olatunji &

Deacon, 2007; Lee et al., 2014). It is possible that the SHAI-18 also captures broader anxiety-related processes for example, question 10 “If I have a bodily sensation or change, I wonder what it means” may also be rated highly for an individual with panic disorder who may misinterpret an unexplained body sensation related to occupational stress as a medical emergency (e.g. heart attack) (Rachman & de Silva, 2009).

Although there were no significant group differences in HA, HCPs working in oncology showed a higher prevalence (44.8%) and overall mean HA score compared to those in a neurorehabilitation or mental health setting. One possible explanation for this finding may be due to HCPs working in oncology having greater exposure to illness and death, which may serve as potent reminders of immediate illness and mortality leading to higher focus on bodily sensations and health concerns. However, the findings of this study contradict this as there was no significant effect of high levels of exposure to death on HA. This aligns with research by Routledge and Juhl (2010) who found that mortality salience only increased death anxiety for individuals who reported a lack of existential meaning. Taken together with the finding from this study that death anxiety is associated with HA, this shows that it may be how an individual processes and makes sense of mortality that triggers HA rather than the frequency of exposure to death itself.

3.5.2 Relationships between HA, Intolerance of Uncertainty, Death Anxiety and Psychological Flexibility

Aligning with previous research (aan de Stegge et al., 2018; Thomas et al., 2022), death anxiety and psychological flexibility were independently associated with HA scores, however PF did not buffer the impact of DA and HA in this sample. Existential worries around death and dying have been proposed to underlie and amplify health-related worries (Iverach et al., 2014). Congruent with this, the current study revealed death anxiety as the strongest predictor of HA, highlighting how existential fears may play a central role in the development and maintenance of HA in HCPs. Psychological flexibility also emerged as a significant predictor of HA. It is possible that HCPs who have higher psychological flexibility may be better equipped to manage distressing thoughts about health, injury and death, without becoming stuck (Hayes et al., 2006; Kashdan & Rottenberg, 2010)

which may mitigate against HA. Perhaps surprisingly, intolerance of uncertainty was not a significant predictor of HA, which contradicts current research (Boelen & Carleton, 2012; Bredemier et al., 2023). In the context of this study, a possible explanation may be due to HCPs being regularly exposed to unpredictability and high levels of uncertainty because of their work environments (Scott et al., 2023). Similar to exposure interventions where individuals learn to tolerate fear, regular exposure to uncertainty may provide opportunities for HCPs to learn that it is not dangerous (Gee & Odriozola, 2021) and become habituated to tolerating uncertainty. Another plausible explanation may be that HCPs may adopt strategies to tolerate uncertainty, for example Han et al. (2021) found in a group of physicians and trainees that openness and acceptance helped tolerate uncertainty, which are key components of psychological flexibility. As such, intolerance of uncertainty in HCPs may play a lesser role in predicting HA in HCPs.

This current study did not show a significant effect between variables such as clinical experience, age and gender which contradicts previous research (Chen et al., 2019; Kirmizi et al., 2021). The lack of significant differences between demographic variables may be due to certain groups being underrepresented, making it difficult to detect meaningful differences. Interestingly, HA scores significantly differed across ethnic groups, with White participants reporting higher levels of HA symptoms compared to Black, African or Caribbean participants. This may show cultural differences on beliefs and values about health and how symptoms are interpreted (Taylor & Asmundson, 2004).

3.5.3 Exploring HCPs Experiences

Qualitative findings provided rich insights into the experience of HCPs across the settings. Many HCPs, though more frequently those working in oncology and neurorehabilitation reported making more deliberate choices to improve and prevent illness and injury. Preventative measures such as avoiding risky situations and health promoting behaviours such as eating well, exercising more often and avoiding harmful substances were reported by HCPs. Some participants noticed becoming more attuned or vigilant to daily situations that may pose risk to serious injury or health. This may suggest that regular exposure to the detrimental impact of poor health or significant

disability may lead to generalisation from situations they witness at work to their own lives. This may prompt HCPs to reevaluate their own health behaviours and provoke positive lifestyle changes, through the process of vicarious learning (Skversky-Blockq et al., 2021). HCPs exposed to death and/or terminal, life-limiting illnesses shared a broader awareness of existential realities and fragility of health with increased worries about future illness, which has also been reported in other studies (Nwozichi et al., 2020; Rodenbach et a., 2016).

Clinical exposure to dying patients, for example in palliative care has shown to increase a sense of meaning and purpose in the lives of HCPs (Sinclair, 2011). This aligns with the qualitative findings from this study, in which HCPs shared that such experiences led to a shift in perspective about life. They reported placing greater importance on relationships, acceptance of what cannot be controlled and living more in the present moment in accordance with their values. HCPs from all three services highlighted a sense of gratitude for their life and good health, this may be related to witnessing the suffering of others which can prompt appreciation of life or what can be lost (Frias et al., 2011).

Consistent with previous research (Chambers-Baltz et al., 2023; McFarland et al., 2019), HCPs across the three groups reflected on work stressors including demanding workloads, unpredictability and uncertainty, which have been identified as barriers for HCPs in managing emotional distress (Roche et al., 2025). Physical exhaustion and the experience of intense emotions such as grief and guilt, likely as a response to these challenges were reported by HCPs and impacted their personal lives. HCPs described adopting unhealthy coping mechanisms (e.g. increased drinking) and not maintaining healthy routines (e.g. exercising), which is consistent with longstanding findings in the literature exploring HCPs wellbeing (Phiri e al., 2014). HCPs highlighted the importance of stress management strategies and maintaining a work-life balance to promote their wellbeing however, consistent with findings by Ross et al. (2017), for some HCPs long-working hours and physical exhaustion prevented them from being able to do so.

As reported in previous research (Mair et al., 2022; Murray et al., 2019; Scheunemann et al., 2023) a positive work environment was an important protective factor and reported by many HCPs.

Team cohesion, sharing of experiences with colleagues and being able to talk about their emotions were perceived as valuable. In the context of physical health settings, these may work similarly to distal defences as suggested by TMT (Greenberg et al., 1986; Solomon et al., 1991). Shared values, norms and collective identity such as open communication, team support, shared emotional experiences and collaboration may foster belonging, providing symbolic meaning and a shared purpose (Frangieh et al., 2024; Lai & Fleuren, 2022) and mitigate existential dilemmas and occupational stress.

As part of the reflexive process, it is important to acknowledge the researcher's (JF) experience working within cancer services which was a key motivator for undertaking this research. Due to the researcher's clinical and professional experience, they may have a pre-existing awareness of the emotional and physical demands faced by HCPs, and the interpretation of the data may have been shaped by this. The researcher noticed emotional responses of sadness, empathy and personal resonance arise during data analysis which deepened their understanding of the psychological burden experienced by HCPs and the reality of the work. Through supervision and maintaining a journal, the researcher engaged reflexively with the data. Appendix I includes an extract from the researcher's journal.

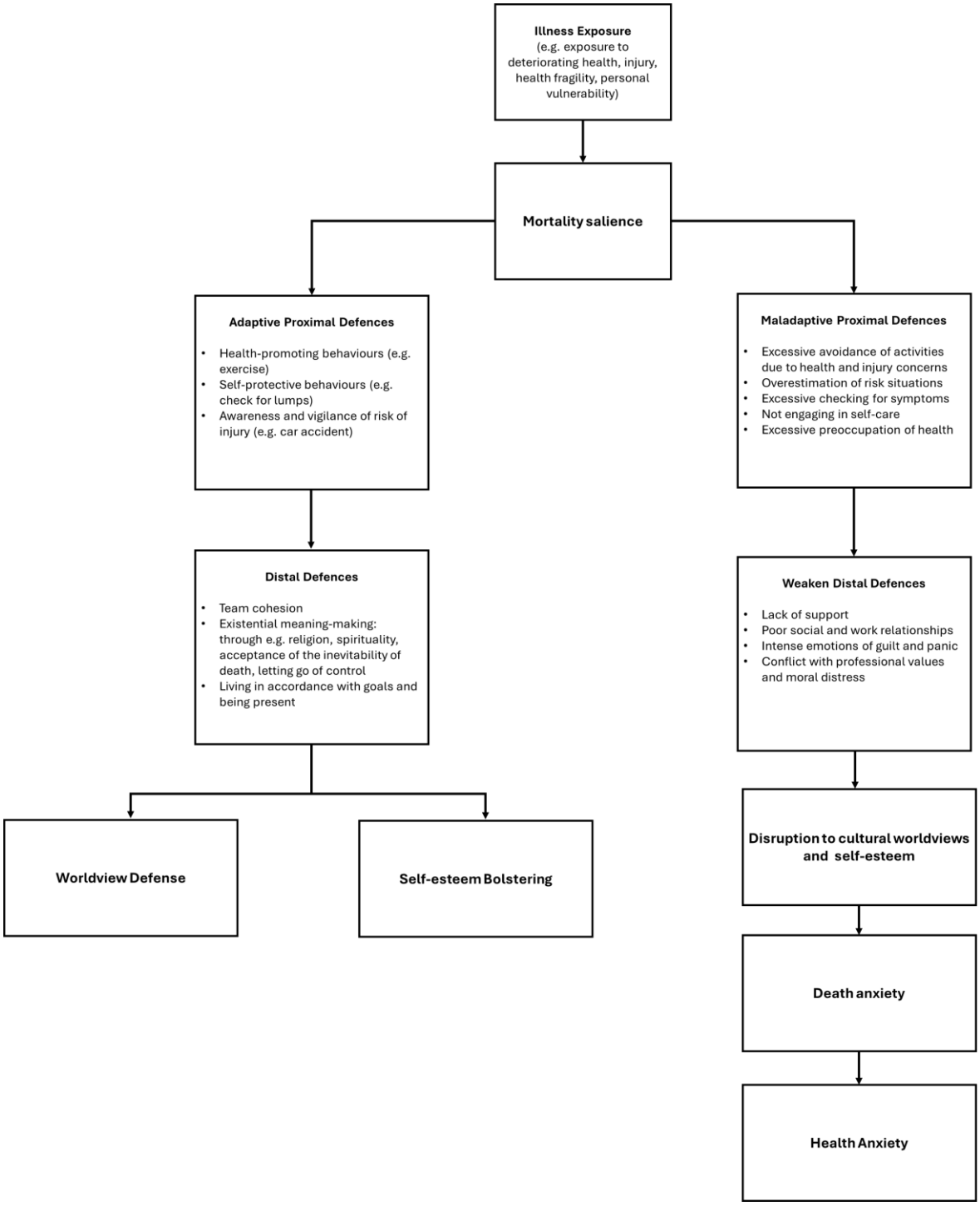
3.5.4 Integration of Quantitative and Qualitative Findings

Together, the quantitative and qualitative findings revealed a notable overlap between the prevalence of HA and health consciousness, especially among HCPs working in settings with high exposure to illness, injury and death. Though no causal links can be drawn between the two due to the nature of the study, the findings may suggest a shared underlying process driving HA and health consciousness within specific staff groups. Although this study did not test the validity of Terror Management Theory TMT (Greenberg et al., 1986; Solomon et al., 1991), it may offer a useful lens for understanding the findings of this study. Quantitatively, death anxiety significantly predicted HA. This is consistent with TMT that morality salience may be triggered by illness exposure or mortality reminders which can heighten anxiety responses. This can be managed by engaging in proximal defences, which as illustrated in Figure 5, may be adaptive and maladaptive. Qualitatively, some

HCPs reported engaging in health-promoting behaviours, increased vigilance to potential threat to injury and positive lifestyle changes. Conversely, exposure to mortality salience, may produce maladaptive proximal defences such as a constant preoccupation related to health, and an excessive focus with bodily sensations and avoidance of health-related risks (Fairlamb et al., 2022). When proximal defences are successful in managing death-related thoughts from conscious awareness, symbolic cultural worldview defences, known as distal defences, are triggered (Greenberg et al., 2000). HCPs reported gratitude, acceptance of death and team cohesion which may act as distal defences and buffer them from existential anxiety. Conversely, the use of maladaptive proximal responses to manage health or death-related threat may maintain anxiety, disrupting the development of effective distal defences (e.g. conflict with professional values, building positive relationships), leaving HCP's prone to developing death anxiety and HA. While this theoretical framework offers a useful interpretation of the observed associations and HCPs reported experiences, it remains explorative and should be interpreted cautiously until this can be validated empirically.

Figure 5

TMT-informed model showing how illness exposure, mortality salience, proximal and distal defences may link to death anxiety and HA



While the quantitative data showed similar HA scores between HCPs working in neurorehabilitation and mental health settings, the qualitative data depicted a more nuanced perspective. HCPs working in neurorehabilitation settings described more frequently than other staff groups an increased awareness of risk to health and injury. This served as a catalyst for behaviour changes to prevent potential injuries, for example increased attentiveness when drinking alcohol to avoid falls and being more cautious when cycling which they may have not thought about prior to working in a neurorehabilitation setting. These experiences may reflect how HCPs working in neurorehabilitation may be more attuned to risks and consequences of injury, resulting in adaptive forms of health-related vigilance, which may have not been captured in HA measures. However, this may call into question if HCPs may have an overrepresentation of risk due to their experiences and whether the safety precautions adopted are proportionate to a realistic risk, or function subtly as safety behaviours to alleviate anxiety. Distinguishing between adaptive behaviours and safety behaviours is important (Sharpe et al., 2022) as anxiety-driven behaviours may go unnoticed due to appearing appropriate given the professional context but may be masking psychological distress.

3.5.5 Strengths and Limitations

The mixed-methods design was a strength of the study as it allowed a more comprehensive understanding of HA in HCPs. The quantitative data examined the associations and differences between HA and transdiagnostic constructs and processes across the samples, while the qualitative data gave insight to HCPs subjective experiences and how they manage health-related fears in environments which are emotive and demanding. Additionally, the researchers accounted for potential confounding variables, enhancing validity and reducing the risk of bias in observed associations.

Despite the strengths of the current study, there are several limitations. There was an overrepresentation of White, females in the age group of 25-34 years compared to the NHS workforce (NHS Digital, 2025) and staff groups were unequal which may impact generalisability and the ability to detect significant differences across variables and groups. The high number of psychology professionals (n = 34) may have also influenced the study given they are more familiar

with constructs such as psychological flexibility, intolerance of uncertainty and death anxiety due to their clinical training. It is possible that this influenced how they responded to measures and introduced bias. Further, psychology professionals may have a greater interest in psychological research and be more motivated to participate, resulting in self-selection bias (Ball, 2019) and limiting the generalisability of the findings to the wider workforce. Additionally, the study's current sample size was smaller than the calculated sample size. This may have increased the risk of type II error, as the smaller sample may have reduced the study's statistical power and potentially limited the ability to detect a difference between the groups (Nayak, 2010).

Additionally, the cross-sectional nature of the study means that assumptions about causality cannot be inferred. The use of an online survey is a limitation due to survey fatigue which may have impacted the validity and reliability of findings. However, using an anonymous survey may have reduced issues with social desirability bias compared to if interviews were used (Podsakoff et al., 2003). Though most scales fell within the good to excellent range of internal consistency, the DAS was in the questionable range. Therefore, results based on the DAS should be interpreted with caution. Lastly, when analysing free-text responses, for some participants it was difficult to discern whether lifestyle changes were driven because of general workplace stressors or context specific stressors such (e.g. exposure to death).

The lack of significant difference across groups may be attributed to the limitations of standardised measures to capture contextual or situational factors (e.g. exposure to illness/death, medical knowledge) that may shape HA in this population. Alternatively, the lack of non-significant finding may be attributed to unequal group sizes, with the oncology group including only 29 HCPs which may have been insufficient to detect true differences (Button et al., 2013).

3.5.6 Clinical & Research Implications

Given the frequency of exposure to death, illness and acute medical illness observed in neurorehabilitation and oncology staff groups, it may be beneficial to implement preventive measures that address the unique occupational stressors faced by different staff groups. Psychoeducational interventions on existential coping and HA may be beneficial in reducing the risk

of psychological distress. They may support HCPs to identify and normalise their responses to mortality cues and distinguish between adaptive and maladaptive health-related behaviours. Careful assessment should be made when working with HCPs about the function of safety precautions or health promoting behaviours and safety behaviours. Clinicians offering psychological support should work collaboratively with individuals to differentiate whether a behaviour is adaptive and informed by their knowledge and occupation or is maintaining anxiety (Sharpe et al., 2022). This is important to avoid pathologising adaptive behaviour or inadvertently reinforcing safety behaviours and overlooking signs of distress.

Programmes enhancing psychological coping have been shown be effective against poor psychological wellbeing (Collett et al., 2024) and those aimed at increasing psychological flexibility have been positively associated with increased use of adaptive coping skills (Akcan, 2025). Process-based interventions (Hayes et al., 2020) which focus on addressing transdiagnostic mechanisms (e.g. psychological flexibility) rather than focusing solely on disorder-specific symptomology may be beneficial in supporting individuals to acknowledge health-related concerns, rather than avoid or becoming entangled in them. Such interventions may equip HCPs to manage workplace stressors, enhance sense of meaning and purpose and increase their capacity to tolerate distress in the face of challenging situations.

Although, approaches promoting wellbeing at an individual level are important, our findings also highlight the buffering role of team support and positive organisational culture in mitigating psychological distress in HCPs. The implementation of post-event team reflection (Thomas-Unsworth et al., 2024) may be helpful to support emotional processing, HCPs wellbeing (Berchtenbreiter et al., 2024) and team cohesion following distressing clinical events (Sweeney et al., 2020). Given, HCPs reported having no time to stop following a critical incident, organisations should consider giving explicit permission and protected time for HCPs to engage in post-event team reflection (Petrosoniak et al., 2022). These interventions may support to shift the onus from individuals to manage their psychological wellbeing through personal coping strategies and resilience to a more collaborative and shared systemic responsibility (Johns et al., 2022).

Future research should aim to replicate the current findings across larger samples and using a more representative sample of the current workforce. While the present study explored the prevalence of HA in staff groups working in inpatient oncology, neurorehabilitation or mental health acute/PICU services, the ability to draw definitive conclusions is limited. Although recruitment was carried out across England, participants were not asked to about their geographical location or employer. Therefore, it is not possible to determine whether the sample reflected a broad geographical spread or if certain areas were under or overrepresented. Future research should consider collecting regional data to enhance representativeness and provide more accurate estimates of the prevalence of HA in this population.

It would be of benefit to further investigate potential moderators that influence how psychological constructs and processes contribute to HA, which can inform more tailored interventions. Hospital sector has shown to be a predictor of HA, with HCPs working in private and semi-private hospitals reporting higher levels of HA than those in public hospitals (Saeedi et al., 2022). Therefore, future research should aim to draw comparisons between sectors (e.g. NHS, private, third sector) given they operate with distinct organisational structures and systemic factors which may impact how HA and psychological distress presents in HCPs across sectors.

The use of open-ended questions in the current study provided valuable insights into HCP's experiences, however, the richness of the responses was inherently limited due to the nature of written survey responses. Future studies should consider incorporating in-depth qualitative measures such as interviews or focus groups to gain a richer exploration of HCP's lived experiences when navigating workplace distress which may not be captured in quantitative measures.

3.6 Conclusion

While the current mixed-methods study did not show an association between staff groups and HA, some important findings were uncovered. Psychological flexibility and death anxiety were identified as predictors of HA. Qualitative data revealed lifestyle changes made by HCPs working in physical health settings, an increase in death and illness-related awareness, acceptance and workplace challenges. The findings underscore the importance of improving support systems

and addressing death anxiety and malleable processes such as psychological flexibility through interventions aiming at promoting staff wellbeing.

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Appendix A PRISMA Checklist

Table 7

PRISMA Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Chapter 2
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Section 2.2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Section 2.2.4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Section 2.3.2 and 2.3.3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Section 2.3.1
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Section 2.3.1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Section 2.3.4

Section and Topic	Item #	Checklist item	Location where item is reported
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Section 2.3.5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Section 2.3
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Section 2.3.5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Section 2.3.6
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Section 2.3.7
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Section 2.3.7
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Section 2.3.5 and 2.3.7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Table 1
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Section 2.3.7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Section Section 2.3.7
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Section 2.3.8
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Section 2.3.7

Section and Topic	Item #	Checklist item	Location where item is reported
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Section 2.4.2 and Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 1
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figure 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 1
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Section 2.4
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Section 2.4
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Section 2.4.7
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Section 2.4.5
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	
DISCUSSION			

Section and Topic	Item #	Checklist item	Location where item is reported
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Section 2.5
	23b	Discuss any limitations of the evidence included in the review.	Section 2.5.1
	23c	Discuss any limitations of the review processes used.	Section 2.5.1
	23d	Discuss implications of the results for practice, policy, and future research.	Section 2.5.2
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	2.3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	2.3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	
Competing interests	26	Declare any competing interests of review authors.	
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	

Appendix B Ergo Ethics Approval

Approved by Faculty Ethics Committee - ERGO II 91081.A1

University of Southampton

ERGO II – Ethics and Research Governance Online https://www.ergo2.soton.ac.uk

Submission ID: 91081.A1
Submission Title: Exploring Health Anxiety in Healthcare Workers: a cross-sectional study. (Amendment 1)
Submitter Name: Juliana Figueiredo

Your submission has now been approved by the Faculty Ethics Committee. You can begin your research unless you are still awaiting any other reviews or conditions of your approval.

Appendix C NHS Health Research Authority Confirmation

Dear Juliana,

It was great chatting to you this morning.

I have run this study past our Coordination and Standardisation team internally to confirm what approvals are needed or not needed with a rational, so the Trusts you approach have a rational to hand.

1. Asking NHS R&D to email all staff contained withing an already existing email distribution list does not require HRA approval. They will be sending information to all staff contained within an already existing email distribution list. They do need to identify an appropriate distribution list, but crucially there's no need for them to check to see if individuals within that distribution list meet the requirements for participation. If they were checking whether individuals within those email distribution lists met any sort of inclusion criteria for the study, that would be data processing and would mean that the NHS is acting as a PIC or site.
2. If you, the researcher wanted to contact your personal contact within the NHS to ask them about the study doesn't need HRA and HCRW Approval. The same rationale for needing HRA and HCRW Approval for sharing information through R&D with others in the NHS applies to the personal contacts sharing information i.e. if they were checking whether individuals within those email distribution lists met any sort of inclusion criteria, that would be data processing and would mean that the NHS is acting as a PIC or site.

The above advice is on the understanding that the information they will be getting from staff is not privileged NHS information and the survey is not collecting information based on specific NHS knowledge per se as I understand this survey is about them as individuals, not the service or patient data etc.

I hope this provides better clarity to your queries.

Kind regards,

Approvals Specialist
Health Research Authority

Appendix D E-mail Template Sent to R&D Teams

Dear R&D Team,

I hope you don't mind me reaching out.

I am a trainee clinical psychologist, completing a Doctoral degree in Clinical Psychology at the University of Southampton. As part of my training, I am completing a research project.

The research seeks to explore health anxiety in healthcare professionals working in inpatient oncology, neurorehabilitation and acute/PICU mental health settings. Healthcare professionals will be invited to complete an anonymous survey which includes demographic information, a range of evidence-based questionnaires and two open-ended questions created by the researchers. Staff are not obliged to participate in the study.

I have obtained ethics from the University of Southampton (attached). I have also been in contact with NHS REC and HRA, who have informed me that I do not require REC or HRA approvals due to the recruitment strategy I am using for the study (attached, red box).

I am reaching out because I wondered if you would be able to support me in advertising the study across your staff network, this can be through distribution lists, newsletters, email bulletins etc. I am happy to arrange a video-call at your convenience if it would be helpful.

Best wishes,

Juliana Figueiredo

Trainee Clinical Psychologist (2022-2025)

Doctorate in Clinical Psychology

Doctoral College (FELS)

University of Southampton

SO17 1BJ

Appendix E Study Poster

PARTICIPANTS NEEDED!
ONLINE STUDY

ARE YOU:

- currently working in a clinical role
- **and** in one of the following inpatient services: oncology, neurorehabilitation, acute or PICU mental health ward?
- fluent in English?

ABOUT THE STUDY

We are interested in exploring health anxiety in healthcare professionals working in different settings.

WHAT WILL YOU BE ASKED TO DO?

You will be invited to complete an online, anonymous survey.

It takes approximately 15-20 minutes to complete.

You will have a chance to win one of three £25 Amazon voucher.

TAKE THE SURVEY AT:

- https://southampton.qualtrics.com/jfe/form/SV_3K1H9kqNQKHEa46

CONTACT

If you have any questions, please contact:

Juliana Figueiredo (researcher)

jf8n22@soton.ac.uk

This study has been approved by the University of Southampton, Research Ethics Committee (Ref: 91081.A1)

University of Southampton

Appendix F LinkedIn Study Advertisement Post

I am currently recruiting participants for my research project as part of my doctoral training at the University of Southampton. If you work in any of the following settings, I would greatly appreciate your participation:

Inpatient Oncology
Neurorehabilitation
Mental Health Acute or PICU Services

Please consider taking part and share this message with your colleagues or network!

To access the survey, simply scan the QR code or click the link below:

https://lnkd.in/g6JmmB4T

Thank you for your time and support!

Appendix G Survey with Information Sheet and Debrief Form

Information Sheet

What is the research about?

My name is Juliana Figueiredo and I am a Trainee Clinical Psychologist student at the University of Southampton in the United Kingdom.

I am inviting you to participate in a study to explore the prevalence and possible underlying factors of health anxiety in healthcare professionals.

This study was approved by the Faculty Research Ethics Committee (FREC) at the University of Southampton (Ethics/ERGO Number: 91081.A1).

What will happen to me if I take part?

This study involves completing an anonymous questionnaire which should take approximately 15-20 minutes of your time. Once you begin to complete the survey, your answers will be saved so that you can return to it later, if you are unable to complete the whole survey at one sitting. If you are happy to complete this survey, you will need to tick (check) the box below to show your consent. As this survey is anonymous, the research team will not be able to know whether you have participated, or what answers you provided.

You can quit the survey at any point before submitting your answers by pressing the 'exit' button or closing the web browser. Your survey responses will be marked as incomplete and deleted after 1 month, so they will not be used in the study's results.

Why have I been asked to participate?

You have been asked to take part because you a healthcare professional working in one of the following clinical areas; inpatient cancer service, inpatient neurorehabilitation service or inpatient mental health service.

To participate in the study you must:
• be working in a clinical role in the NHS, private or charity sector
• be currently in work,
• be able to read and understand English,
• be over the age of 18 years old.

I am aiming to recruit around 140 participants for this study. Your participation is voluntary and you do not have to participate in this study.

You can contact the researchers if you have any questions about the research to help you make a decision before taking part.

What information will be collected?

You will firstly be asked some eligibility questions to make sure you are able to take part in the study, followed by some questions about yourself such as your age, gender and employment. You will then be asked to complete some questionnaires which ask about

mental health, these are in the form of likert scales and one text box questions about your lifestyle and an opportunity to add any other comments.

As this survey is anonymous, the research team will not know who has participated.

Some of the survey questions contain textboxes where you will be asked to type in your own answers. Please note that in order for this survey to be anonymous, you should not include in your answers any information from which you, or other people, could be identified.

What are the possible benefits of taking part?

If you decide to take part in this study, you will not receive any direct benefits; however, your participation will contribute to knowledge in this area of research.

At the end of the survey, you will have the option to enter a prize draw to win one of three £25 Amazon vouchers.

Are there any risks involved?

It is not anticipated that this study will cause any psychological distress or discomfort, however, should you feel uncomfortable you can quit the survey at any point before submitting your answers by pressing the 'exit' button or closing the web browser.

If participation causes you to feel distressed or discomfort in any way, and you would like to discuss this we recommend the following services:

Samaritans Tel: 116 123 E-mail: jo@samaritans.org Website: https://www.samaritans.org/

Mind *Tel:* 0300 123 3393 *E-mail:* info@mind.org.uk *Website:* https://www.mind.org.uk/ *Post:* Mind Infoline, PO Box 75225, London, E15 9FS

Macmillan Cancer Support *Tel:* 0808 808 00 00 *Website:* https://www.macmillan.org.uk/

Headway *Tel:* 0808 800 2244 *E-mail:* helpline@headway.org.uk *Website:* https://www.headway.org.uk/ If you think you could benefit from talking to a mental health professional, please contact your GP who can help you explore options.

What will happen to the information collected?

All information collected for this study will be stored securely on a password protected computer and backed up on a secure server. Please note to avoid submitting multiple responses or losing your place on the survey, Qualtrics website uses GDPR compliant browser cookies. All data but the textbox answers will be pooled and only compiled into data summaries and reports. Direct quotes from textboxes answers may be used in reports,

however any identifiable information will be removed prior to analysis and for dissemination of results.

Only the researcher and their supervisor will have access to this information.

The data will be analysed and written up as a thesis as part of the Doctorate in Clinical Psychology, published in a journal, and presented at conferences.

The University of Southampton conducts research to the highest standards of ethics and research integrity. In accordance with our Research Data Management Policy, data will be held for 10 years after the study has finished when it will be securely destroyed.

What happens if there is a problem?

If you are unhappy about any aspect of this study and would like to make a formal complaint, you can contact the Head of Research Integrity and Governance, University of Southampton, on the following contact details:

Email: rgoinfo@soton.ac.uk,
phone: + 44 2380 595058.

Please quote the following Ethics/ERGO number: 91081.A1. Please note that by making a complaint you might be no longer anonymous.

More information on your rights as a study participant is available via this link:
https://www.southampton.ac.uk/about/governance/participant-information.page

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Q91 **Thank you for reading this information sheet and considering taking part in this research.**

- ○ Please tick (check) this box to indicate that you have read and understood information on this form, are aged 18 or over and agree to take part in this survey. (1)
- ○ No, I do not agree to take part (2)

Do you currently work in a clinical role?

- ○ Yes, in the NHS (1)
- ○ Yes, in the private sector (3)
- ○ Yes, in the charity sector (4)
- ○ No (2)

Do you currently work in one of the following areas; inpatient oncology, inpatient neurorehabilitation, inpatient mental health; Psychiatric Intensive Care Unit (PICU) or Mental Health Acute Unit?

- ○ Yes (1)
- ○ No (2)

Do you have a diagnosis of a terminal (also called as life-limiting) physical health illness? A terminal illness is an illness or condition which cannot be cured and is likely to lead to death.

- ○ Yes (1)
- ○ No (2)

Did you experience diagnosable health anxiety prior to working in your current job? *Health anxiety is defined as worrying excessively that you are or may become seriously ill. People with health anxiety will experience persistent anxiety or fear of developing or having a serious medical illness that adversely affects their daily life.* Please do not tick this box if you have experienced health anxiety as a result of working in your current job.

- ○ Yes (1)
- ○ No (2)

Which type of service do your work in?

- ○ Inpatient Oncology (1)
- ○ Inpatient Neurorehabilitation (2)
- ○ Inpatient Mental Health; Acute / Psychiatric Intensive Care Unit (PICU) (3)

What is your role?

_____

Years of Clinical Experience in this area

- ○ 0-6 months (1)
- ○ 6 months - 1 year (2)
- ○ 1-2 years (3)
- ○ 2-4 years (4)
- ○ 4-6 years (5)
- ○ 6-8 years (6)
- ○ 8-10 years (7)
- ○ 10+ years (8)

Have you experienced a significant loss/bereavement in the past 12 months due to illness?

- ○ Yes (1)
- ○ No (2)

What best describes your ethnic origin?

- ☐ White (1)
- ☐ Black/African/Caribbean (2)
- ☐ Asian (Indian, Pakistani, Bangladeshi, Chinese, any other Asian background) (3)
- ☐ Mixed two or more ethnic groups (4)
- ☐ Other (Arab or any others) (5)
- ☐ Prefer not to say (6)

What is your age group?

- ○ 18-24 (1)
- ○ 25-34 (2)
- ○ 35-44 (3)
- ○ 45-54 (4)
- ○ 55-64 (5)
- ○ 65-74 (6)
- ○ 75 or over (7)
- ○ Prefer not to say (8)

To which gender identity do you most identify?

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary (3)
- ○ Transgender Female (4)
- ○ Transgender Male (5)
- ○ Prefer not to say (6)
- ○ Other (7)

What is your present religion, if any?

- ○ No religion (1)
- ○ Christian (including Church of England, Catholic, Protestant and all other Christian denominations) (2)
- ○ Buddhist (3)
- ○ Hindu (4)
- ○ Jewish (5)
- ○ Muslim (6)
- ○ Sikh (7)
- ○ Other (8)
- ○ Prefer not to say (9)

Q83 Do you consider yourself a spiritual person?

- ○ Yes (1)
- ○ No (2)
- ○ Prefer not to say (3)

Q85 In your clinical role, how often are you exposed to patient's death?

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Q78 In your clinical role, how often are you exposed to individual's experiencing an acute life-threatening medical emergency (e.g. caused by a sudden catastrophic event, such as an accident or stroke)?

- Always (1)
- Often (2)
- Sometimes (3)
- Rarely (4)
- Never (5)

Q79 In your clinical role, how often are you exposed to individual's with a terminal or life-limiting illness? A terminal illness (also called as life-limiting) is an illness or condition which cannot be cured and is likely to lead to death.

- Always (1)
- Often (2)
- Sometimes (3)
- Rarely (4)
- Never (5)

Each question consists of a group of four statements. Please read each group of statements carefully and then select the one which best describes your feelings OVER THE PAST WEEK.

Q1

- I do not worry about my health (1)
- I occasionally worry about my health (2)
- I spend much of my time worrying about my health (3)
- I spend most of my time worrying about my health (4)

Q2

- I notice aches/pains less than most other people (of my age) (1)
- I notice aches/pains as much as most other people (of my age) (2)
- I notice aches/pains more than most other people (of my age) (3)
- I am aware of aches/pains in my body all the time (4)

Q3

- As a rule I am not aware of bodily sensations or changes (1)
- Sometimes I am aware of bodily sensations or changes (2)
- I am often aware of bodily sensations or changes (3)
- I am constantly aware of bodily sensations or changes (4)

Q4

- Resisting thoughts of illness is never a problem (1)
- Most of the time I can resist thoughts of illness (2)
- I try to resist thoughts of illness but am often unable to do so (3)
- Thoughts of illness are so strong that I no longer even try to resist them (4)

Q5

- As a rule I am not afraid that I have a serious illness (1)
- I am sometimes afraid that I have a serious illness (2)
- I am often afraid that I have a serious illness (3)
- I am always afraid that I have a serious illness (4)

Q6

- I do not have images (mental pictures) of myself being ill (1)
- I occasionally have images of myself being ill (2)
- I frequently have images of myself being ill (3)
- I constantly have images of myself being ill (4)

Q7

- I do not have any difficulty taking my mind off thoughts about my health (1)
- I sometimes have difficulty taking my mind off thoughts about my health (2)
- I often have difficulty taking my mind off thoughts about my health (3)
- Nothing can take my mind off thoughts about my health (4)

Q8

- I am lastingly relieved if my doctor tells me there is nothing wrong (1)
- I am initially relieved but the worries sometimes return later (2)
- I am initially relieved but the worries always return later (3)
- I am not relieved if my doctor tells me there is nothing wrong (4)

Q9

- If I hear about an illness I never think I have it myself (1)
- If I hear about an illness I sometimes think I have it myself (2)
- If I hear about an illness I often think I have it myself (3)
- If I hear about an illness I always think I have it myself (4)

Q10

- If I have a bodily sensation or change I rarely wonder what it means (1)
- If I have a bodily sensation or change I often wonder what it means (2)
- If I have a bodily sensation or change I always wonder what it means (3)
- If I have a bodily sensation or change I must know what it means (4)

Q11

- I usually feel at very low risk of developing a serious illness (1)
- I usually feel at fairly low risk of developing a serious illness (2)
- I usually feel at moderate risk of developing a serious illness (3)
- I usually feel at high risk of developing a serious illness (4)

Q12

- I never think I have a serious illness (1)
- I sometimes think I have a serious illness (2)
- I often think I have a serious illness (3)
- I usually think that I am seriously ill (4)

Q13

- If I notice an unexplained bodily sensation I don't find it difficult to think about other things (1)
- If I notice an unexplained bodily sensation I sometimes find it difficult to think about other things (2)
- If I notice an unexplained bodily sensation I often find it difficult to think about other things (3)
- If I notice an unexplained bodily sensation I always find if difficult to think about other things (4)

Q14

- My family/friends would say I do not worry enough about my health (1)
- My family/friends would say I have a normal attitude to my health (2)
- My family/friends would say I worry too much about my health (3)
- My family/friends would say I am a hypochondriac (4)

Q87 For the following questions, please think about what it might be like if you had a serious illness of a type which particularly concerns you (such as heart disease, cancer, multiple sclerosis and so on). Obviously you cannot know for definite what it would be like; please give your best estimate of what you THINK might happen, basing your estimate on what you know about yourself and serious illness in general.

Q15

- If I had a serious illness I would still be able to enjoy things in my life quite a lot (1)
- If I had a serious illness I would still be able to enjoy things in my life a little (2)
- If I had a serious illness I would be almost completely unable to enjoy things in my life (3)
- If I had a serious illness I would be completely unable to enjoy life at all (4)

Q16

- ○ If I developed a serious illness there is a good chance that modern medicine would be able to cure me (1)
- ○ If I developed a serious illness there is a moderate chance that modern medicine would be able to cure me (2)
- ○ If I developed a serious illness there is a very small chance that modern medicine would be able to cure me (3)
- ○ If I developed a serious illness there is no chance that modern medicine would be able to cure me (4)

Q17

- ○ A serious illness would ruin some aspects of my life (1)
- ○ A serious illness would ruin many aspects of my life (2)
- ○ A serious illness would ruin almost every aspect of my life (3)
- ○ A serious illness would ruin every aspect of my life (4)

Q18

- ○ If I had a serious illness I would not feel that I had lost my dignity (1)
- ○ If I had a serious illness I would feel that I had lost a little of my dignity (2)
- ○ If I had a serious illness I would feel that I had lost quite a lot of my dignity (3)
- ○ If I had a serious illness I would feel that I had totally lost my dignity (4)

Select the box beside the reply that is closest to how you have been feeling OVER THE PAST WEEK. Don't take too long over you replies: your immediate is best

---

I feel tense or 'wound up'

- Most of the time (1)
- A lot of the time (2)
- Occasionally (3)
- Not at all (4)

I still enjoy the things I used to enjoy

- Definitely as much (1)
- Not quite so much (2)
- Only a little (3)
- Hardly at all (4)

I get a sort of frightened feeling as if something awful is about to happen

- Very definitely & quite badly (1)
- Yes, but not too badly (2)
- A little, but it doesn't worry me (3)
- Not at all (4)

I can laugh and see the funny side of things

- As much as always (1)
- Not quite so much now (2)
- Definitely not so much now (3)
- Not at all (4)

Worrying thoughts go through my mind

- A great deal of the time (1)
- A lot of the time (2)
- From time to time, but not too often (3)
- Only occasionally (4)

I feel cheerful

- Not at all (1)
- Not often (2)
- Sometimes (3)
- Most of the time (4)

I can sit at ease and feel relaxed

- Definitely (1)
- Usually (2)
- Not often (3)
- Not at all (4)

I feel as if I am slowed down

- Nearly all the time (1)
- Very often (2)
- Sometimes (3)
- Not at all (4)

I get a sort of frightened feeling like ‘butterflies' in the stomach

- ○ Not at all (1)
- ○ Occasionally (2)
- ○ Quite Often (3)
- ○ Very Often (4)

I have lost interest in my appearance

- ○ Definitely (1)
- ○ I don't take as much care as I should (2)
- ○ I may not take as much care (3)
- ○ I take just as much care as ever (4)

I feel restless as if I have to be on the move

- ○ Very much indeed (1)
- ○ Quite a lot (2)
- ○ Not very much (3)
- ○ Not at all (4)

I look forward to enjoyment to things

- ○ As much as I ever did (1)
- ○ Rather less than I used to (2)
- ○ Definitely less than I used to (3)
- ○ Hardly at all (4)

I get sudden feelings of panic

- ○ Very often indeed (1)
- ○ Quite often (2)
- ○ Not very often (3)
- ○ Not at all (4)

I can enjoy a good book or radio or TV programme

- ○ Often (1)
- ○ Sometimes (2)
- ○ Not often (3)
- ○ Very seldom (4)

I am very much afraid to die.

- ○ True (1)
- ○ False (2)

The thought of death seldom enters my mind.

- ○ True (1)
- ○ False (2)

It does not make me nervous when people talk about death.

- ○ True (1)
- ○ False (2)

I dread to think about having to have an operation.

- True (1)
- False (2)

I am not at all afraid to die.

- True (1)
- False (2)

I am not particularly afraid of getting cancer.

- True (1)
- False (2)

The thought of death never bothers me.

- True (1)
- False (2)

I am often distressed by the way time flies so very rapidly.

- True (1)
- False (2)

I fear dying a painful death.

- True (1)
- False (2)

The subject of life after death troubles me greatly.

- True (1)
- False (2)

I am really scared of having a heart attack.

- True (1)
- False (2)

I often think about how short life really is.

- True (1)
- False (2)

I shudder when I hear people talk about a World War III.

- True (1)
- False (2)

The sight of a dead body is horrifying to me.

- True (1)
- False (2)

I feel that the future holds nothing for me to fear.

- True (1)
- False (2)

Q78 Due to working in this setting, have you made lifestyle changes (i.e. eating and drinking, physical safety, exercising, stress management, health monitoring, social) that you did not do before?

Q52 Please select the number that best corresponds to how much you agree with each statement OVER THE LAST WEEK.

	1 (Not at all characteristic of me) (1)	2 (2)	3 (3)	4 (4)	5 (Very Characteristic of me) (5)
Unforeseen events upset me greatly (1)	○	○	○	○	○
It frustrates me not having all the information I need. (2)	○	○	○	○	○
Uncertainty keeps me from living a full life. (3)	○	○	○	○	○
One should always look ahead so as to avoid surprises. (4)	○	○	○	○	○
A small, unforeseen event can spoil everything, even with the best of planning. (5)	○	○	○	○	○
When it's time to act, uncertainty paralyses me. (6)	○	○	○	○	○
When I am uncertain I can't function very well. (7)	○	○	○	○	○
I always want to know what the future has in store for me. (8)	○	○	○	○	○
I can't stand being taken by surprise. (9)	○	○	○	○	○
The smallest doubt can stop me from acting. (10)	○	○	○	○	○
I should be able to organize everything in advance. (11)	○	○	○	○	○

I must get away from all uncertain situations. (12)	○	○	○	○	○

Select the box beside the reply that is closest to how you have been feeling OVER THE PAST WEEK.

Even if I am somewhere else with my thoughts, I can focus on what's going on in important moments.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

If need be, I can let unpleasant thoughts and experiences happen without having to get rid of them immediately.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

I can look at hindering thoughts from a distance without letting them control me.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

Even if thoughts and experiences are confusing me I can notice something like a steady core inside of me.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

I determine what's important for me and decide what I want to use my energy for.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

I engage thoroughly in things that are important, useful, or meaningful to me.

- ○ Very often (1)
- ○ Often (2)
- ○ From time to time (3)
- ○ Seldom (4)
- ○ Very seldom (5)

Q66 Is there anything else that you feel is important about your experience in working in this setting?

_____

Debrief Form

Thank you for taking part in our research project. Your contribution is very valuable and greatly appreciated.

Purpose of the study

The aim of this research was to explore whether there are differences in healthcare professionals working in inpatient cancer services, inpatient neurorehabilitation services and inpatient mental health services in experiencing health anxiety. Some studies have shown that healthcare professionals are more likely to experience health anxiety compared to the general population, however to the researcher's knowledge there is no known studies of this in the UK.

Your data will help us understand whether there is a higher prevalence of health anxiety in certain staff groups and whether there are certain predictors that may help identify at-risk groups. Additionally, this research seeks to explore other possible underlying mechanisms that may affect health anxiety such as death anxiety, intolerance of uncertainty, psychological flexibility. Exploring these predictors and underlying mechanisms may aid the development of more targeted and effective interventions to support healthcare professionals in managing symptoms related to health anxiety. Finally, your responses will also allow us to explore whether as a result of your direct work with a specific client group, if that influences lifestyle changes.

Because of the study design, there was some information about this research that could not be shared with you prior to the study, as doing so probably would have impacted your actions and responses.

We hope that this form clarifies the purpose of the research, and the reason why we could not tell you all the study details prior to your participation. We hope that you understand the reason for the use of deception.

Please do not discuss this study, or show this debriefing form, to anyone until the study is

complete, as this could affect the study results.

Confidentiality

Results of this study will not include your name or any other identifying characteristics

Study Results & Prize Draw.

If you would like to receive a copy of the final report or enter a prize draw to win 1 of 3, £25 Amazon vouchers, please click on the below link which will take you to a separate survey to collect your contact details. It is up to you whether you would like to receive study results. Please note that by providing your contact details, your participation in the study might be no longer anonymous, but researcher will not know what responses you provided.

Link for Study Results and/or Prize Draw:

https://southampton.qualtrics.com/jfe/form/SV_a5fK847YsI2jK6y

Further support

If taking part in this study has caused you discomfort or distress, you can contact the following organisations for support:

Samaritans
Tel: 116 123
E-mail: jo@samaritans.org
Website: https://www.samaritans.org/

Mind
Tel: 0300 123 3393
E-mail: info@mind.org.uk
Website: https://www.mind.org.uk/
Post: Mind Infoline, PO Box 75225, London, E15 9FS

Macmillan Cancer Support
Tel: 0808 808 00 00
Website: https://www.macmillan.org.uk/

Headway
Tel: 0808 800 2244
E-mail: helpline@headway.org.uk
Website: https://www.headway.org.uk/

If you think you could benefit from talking to a mental health professional, please contact your GP who can help you explore options.

Further reading

If you would like to learn more about this area of research, you can refer to the following resources:

Chen, Q., Zhang, Y., Zhuang, D., Mao, X., Mi, G., Wang, D., Du, X., Yi, Z., Shen, X., Sui, Y., Li, H., Cao, Y., Zhu, Z., Hou, Z., Li, Q., & Yuan, Y. (2019). Health anxiety in medical employees: A multicentre study. Journal of International Medical Research, 47(10), 4854–4861. https://doi.org/10.1177/0300060519872310

Zhang, Y., Zhao, Y., Mao, S., Li, G., & Yuan, Y. (2014). Investigation of health anxiety and its related factors in nursing students. Neuropsychiatric Disease and Treatment, 1223. https://doi.org/10.2147/ndt.s61568

Further information

If you have any concerns or questions about this study, please contact Juliana Figueiredo at jf8n22@soton.ac.uk who will do their best to help.

If you remain unhappy or would like to make a formal complaint, please contact the Head of Research Integrity and Governance, University of Southampton, by emailing: rgoinfo@soton.ac.uk, or calling: + 44 2380 595058.

Please quote the following Ethics/ERGO number: 91081.A1. Please note that if you participated in an anonymous survey, by making a complaint, you might be no longer anonymous.

Thank you again for your participation in this research.

Appendix H Prize Draw Survey

Survey Results & Prize Drawn

Would you like to enter a prize draw to win 1 of 3, £25 Amazon Vouchers? Your e-mail address will be removed from the file once the prize draw is completed and winners informed.

- ○ Yes (1)
- ○ No (2)

Would you like to receive a copy of the final report? Please note that by providing your contact details, your participation in the study might be no longer anonymous, but researcher will not know what information you provided. Your e-mail will be removed from file as soon as the results are disseminated.

- ○ Yes (1)
- ○ No (2)

Please enter your e-mail address

_____

Appendix I Reflexive Journal Entry

Reflexive Journal Entry	**Date: 01/04/2025**

I am still reading over participants responses, I thought I would start to get tired of this process, but I've noticed that each time I read over the responses, I notice something different or new. I understand the importance now of re-reading data many times, before moving onto the next stage of the analysis.

Today, I felt a lot of different emotions… sad, anger, relief. I noticed my heart palpitating to some responses, and one particular response that caught my attention, was someone who wrote about increased checking and monitoring behaviours. I realised that's because I resonated with it. When I worked in a cancer service I was more attuned to physical changes and sensations in my body.

Reading some responses made me feel sad, and I found myself reflecting on the broader systemic issues such as lack of support, limited resources and organisational culture. I felt a sense of stuckness and recognise this is probably an experience HCPs also feel.

I also feel a sense of gratitude that HCPs took time to complete this study and share their experiences. Though, I am worried about getting it "wrong", or not